

Curriculum Vitae (updated as of November 2025)  
Manas Kulkarni  
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International Centre for Theoretical Sciences (ICTS)  
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## Current Employment

- Associate Professor (G), International Centre for Theoretical Sciences, Tata Institute of Fundamental Research, ICTS-TIFR, Bangalore, INDIA

## Previous Employment

- City University of New York , New York, USA, Assistant Professor of Physics (Tenure-Track), 2014 - 2016
- Princeton University, New Jersey, USA, Post-Doctoral Research Associate, 2012-2014
- University of Toronto, CANADA, Post-Doctoral Fellow, 2011-2012

## Education

- Ph.D in Physics: State University of New York at Stony Brook, USA (co-advisor at Brookhaven National Laboratory, USA) , 2011, Ph.D. award date: August 18, 2011
- Masters in Physics: State University of New York at Stony Brook, USA, 2007
- Bachelors Honors in Physics: St. Stephens College, University of Delhi, INDIA, 2005

## Publications

111. A. Naik, B. K. Agarwalla, **M. Kulkarni**, arXiv:2511.06706 (2025), "Dynamics of number entropy for free fermionic systems in presence of defects and stochastic processes"
110. T. Ray, K. Ganguly, D. Poletti, **M. Kulkarni**, B. K. Agarwalla, arXiv:2511.00577 (2025), "Quantum dynamics in lattices in presence of bulk dephasing and a localized source"
109. C. Aron, **M. Kulkarni**, arXiv:2510.07394 (2025), "Localization of information driven by stochastic resetting"
108. D. Charamis, **M. Kulkarni**, J. Kurchan, L. Foini, 2509.14406 (2025), "Quenched properties of the Spectral Form Factor"
107. N. Mesquita, **M. Kulkarni**, S. N. Majumdar, S. Sabhapandit, arXiv:2509.00487 (2025), "Dynamically generated correlations in a trapped bosonic gas via frequency quenches"
106. R. Mukherjee, A. Dhar, **M. Kulkarni**, S. S. Ray, arXiv:2509.00399 (2025), "Extreme dynamics and relaxation of quantum gases: A hydrodynamic approach"

105. M. Biroli, S. Ciliberto, **M. Kulkarni**, S. N. Majumdar, A. Petrosyan, G. Schehr, arXiv:2508.07199 (2025), "Experimental evidence for strong emergent correlations between particles in a switching trap"
104. G. Del Vecchio Del Vecchio, **M. Kulkarni**, S. N. Majumdar, S. Sabhapandit, arXiv:2507.05800 (2025), "Proxitaxis: an adaptive search strategy based on proximity and stochastic resetting"
103. T. Ray, A. Dhar, **M. Kulkarni**, arXiv:2504.14675 (2025), "Page curve like dynamics in Interacting Quantum Systems"
102. D. Roy, A. Dhar, **M. Kulkarni**, H. Spohn, J. Stat. Mech. (2025) 073209 (2025), "Fixed Points and Universality Classes in Coupled Kardar-Parisi-Zhang Equations"
101. M. Prasad, S. H. Tekur, B. K. Agarwalla, **M. Kulkarni**, Phys. Rev. B 111, L161408 (2025), "Assessment of spectral phases of non-Hermitian quantum systems through complex and singular values"
100. S. Jose, **M. Kulkarni**, V. Vasan, Stud Appl Math., 155: e70090 (2025), "Emergence of coupled Korteweg-de Vries equations in m fields"
99. K. Ganguly, P. Gopalakrishnan, A. Naik, B. K. Agarwalla, **M. Kulkarni**, arXiv:2501.12110 (2025), "Quantum trajectories and Page-curve entanglement dynamics"
98. M. Saha, B. K. Agarwalla, **M. Kulkarni**, A. Purkayastha, Phys. Rev. B 111, L041405 (2025), "Arbitrary order transfer matrix exceptional points and van Hove singularities"
97. J. Kethepalli, **M. Kulkarni**, A. Kundu, H. Spohn, J. Stat. Mech. (2025) 033101 (2025), "Lax random matrices from Calogero systems"
96. **M. Kulkarni**, S. N. Majumdar, S. Sabhapandit, J. Phys. A: Math. Theor. 58 105003 (2025), "Dynamically emergent correlations in bosons via quantum resetting"
95. M. Saha, B. K. Agarwalla, **M. Kulkarni**, A. Purkayastha, Phys. Rev. B 111, 125412 (2025), "Effect of order of transfer matrix exceptional points on transport at band edges"
94. C. Aron, **M. Kulkarni**, Phys. Rev. E 112, 014220 (2025), "Control of spatiotemporal chaos by stochastic resetting"
93. A. Ghatak, D. H. Kaltsas, **M. Kulkarni**, K. G. Makris, Phys. Rev. E 110, 064228 (2024), "Diffraction and pseudospectra in non-Hermitian quasiperiodic lattices"
92. S. H. Tekur, M. S. Santhanam, B. K. Agarwalla, **M. Kulkarni**, Phys. Rev. B 110, L241410 (2024), "Higher-order gap ratios of singular values in open quantum systems"
91. K. Ganguly, **M. Kulkarni**, B. K. Agarwalla, Phys. Rev. B 110, 235425 (2024), "Transport in open quantum systems in presence of lossy channels"

90. A. Dhawan, K. Ganguly, **M. Kulkarni**, B. K. Agarwalla, Phys. Rev. B 110, L081403 (2024), "Anomalous transport in long-ranged open quantum systems"
89. T. Ray, **M. Kulkarni**, Phys. Rev. A 110, 032220 (2024), "Ergodic and chaotic properties in Tavis-Cummings dimer: quantum and classical limit"
88. J. Kethepalli, **M. Kulkarni**, A. Kundu, S. N. Majumdar, D. Mukamel, G. Schehr, J. Stat. Mech. (2024) 083206 (2024), "Full counting statistics of 1d short-range Riesz gases in confinement"
87. M. Saha, **M. Kulkarni**, A. Dhar, Phys. Rev. Lett. 133, 230402 (2024), "Generalised Hydrodynamics description of the Page curve-like dynamics of a freely expanding fermionic gas", See commentary on our work by Masaki Oshikawa (Tokyo), [Expanding Fermi Gas and Black Hole Information](#)
86. D. Roy, A. Dhar, K. Khanin, **M. Kulkarni**, H. Spohn, J. Stat. Mech. (2024) 033209 (2024), "Universality in coupled stochastic Burgers systems with degenerate flux Jacobian"
85. S. Gupta, H. K. Yadalam, **M. Kulkarni**, C. Aron, Phys. Rev. A 109, L050201 (2024), "Quantum jumps in driven-dissipative disordered many-body systems"
84. M. Biroli, **M. Kulkarni**, S. N. Majumdar, G. Schehr, Phys. Rev. E 109, L032106 (2024), "Dynamically emergent correlations between particles in a switching harmonic trap"
83. B. Ghosh, S. Mohanta, **M. Kulkarni**, B. K. Agarwalla, J. Stat. Mech. (2024) 063101 (2024), "Impact of dephasing probes on incommensurate lattices"
82. D. Roy, A. Dhar, H. Spohn, **M. Kulkarni**, Phys. Rev. E 110, 044110 (2024), "Nonequilibrium spin transport in integrable and non-integrable classical spin chains"
81. **M. Kulkarni**, S. N. Majumdar, Phys. Rev. A 108, 062210 (2023), "Generating Entanglement by Quantum Resetting"
80. D. Bagchi, J. Kethepalli, V. B. Bulchandani, A. Dhar, D. A. Huse, **M. Kulkarni**, A. Kundu, Phys. Rev. E 108, 064130 (2023), "Unusual ergodic and chaotic properties of trapped hard rods"
79. **M. Kulkarni**, S. N. Majumdar, J. Phys. A: Math. Theor. 56, 385003 (2023), "First detection probability in quantum resetting via random projective measurements"
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77. M. Saha, **M. Kulkarni**, B. K. Agarwalla, Phys. Rev. B 108, 075406 (2023), "Exceptional hyper-surfaces of transfer matrices of finite-range lattice models and their consequences on quantum transport properties"

76. S. Pandey, J. M. Bhat, A. Dhar, S. Goldstein, D. A. Huse, **M. Kulkarni**, A. Kundu, J. L. Lebowitz. J. Stat. Phys. 190, 142 (2023), "Boltzmann entropy of a freely expanding quantum ideal gas"
75. D. Roy, D. A. Huse, **M. Kulkarni**, Phys. Rev. E 108, 054112 (2023), "Out-of-time-ordered correlator in the one-dimensional Kuramoto-Sivashinsky and Kardar-Parisi-Zhang equations"
74. A. Agarwal, **M. Kulkarni**, D. H. J. O'Dell, Phys. Rev. A 108, 013312 (2023), "Caustics in the sine-Gordon model from quenches in coupled 1D Bose gases"
73. D. Tupkary, A. Dhar, **M. Kulkarni**, A. Purkayastha, Phys. Rev. A 107, 062216 (2023), "Searching for Lindbladians obeying local conservation laws and showing thermalization"
72. J. Kethapalli, D. Bagchi, A. Dhar, **M. Kulkarni**, A. Kundu, Phys. Rev. E 107, 044101 (2023), "Finite temperature equilibrium density profiles of integrable systems in confining potentials"
71. A. Trivedi, S. Gupta, B. K. Agarwalla, A. Dhar, **M. Kulkarni**, A. Kundu, S. Sabhapandit, Phys. Rev. A 108, 052204 (2023), "Filling an empty lattice by local injection of quantum particles"
70. M. Saha, B. K. Agarwalla, **M. Kulkarni**, A. Purkayastha, Phys. Rev. B 108, L161115 (2023), "Environment assisted superballistic scaling of conductance"
69. **M. Kulkarni**, P. Le Doussal, S. N. Majumdar, G. Schehr, Phys. Rev. A 107, 023302 (2023), "Density profile of noninteracting fermions in a rotating 2d trap at finite temperature"
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67. M. Prasad, A. Prakash, J. H. Pixley, **M. Kulkarni**, J. Phys. A: Math. Theor. 57 015003 (2023), "Long-ranged spectral correlations in eigenstate phases"
66. D. Roy, A. Dhar, H. Spohn, **M. Kulkarni**, Phys. Rev. B 107, L100413 (2023), "Robustness of Kardar-Parisi-Zhang scaling in a classical integrable spin chain with broken integrability"
65. M. Saha, B. K. Agarwalla, **M. Kulkarni**, A. Purkayastha, Phys. Rev. Lett. 130, 187101 (2023), "Universal subdiffusive behavior at band edges from transfer matrix exceptional points"
64. M. Prasad, H. K. Yadalam, **M. Kulkarni**, C. Aron, J. Phys. A: Math. Theor. 57 015308 (2023), "Transition to chaos in extended systems and their quantum impurity models"

63. T. Ray, A. Dey, **M. Kulkarni**, Phys. Rev. A 106, 042610 (2022), "Localization and delocalization in networks with varied connectivity"
62. M. Prasad, H. K. Yadalam, C. Aron, **M. Kulkarni**, Phys. Rev. A 105, L050201 (2022), "Dissipative quantum dynamics, phase transitions and non-Hermitian random matrices"
61. J. Kethepalli, **M. Kulkarni**, A. Kundu, S. N. Majumdar, D. Mukamel, G. Schehr, J. Stat. Mech. (2022) 033203 (2022), "Edge fluctuations and third-order phase transition in harmonically confined long-range systems",
60. S. Santra, J. Kethepalli, S. Agarwal, A. Dhar, **M. Kulkarni**, A. Kundu, Phys. Rev. Lett. 128, 170603 (2022), "Gap statistics for confined particles with power-law interactions"
59. D. Tupkary, A. Dhar, **M. Kulkarni**, A. Purkayastha, Phys. Rev. A 105, 032208 (2022), "Fundamental limitations in Lindblad descriptions of systems weakly coupled to baths"
58. V. B. Bulchandani, **M. Kulkarni**, J. E. Moore, X. Cao, J. Phys. A: Math. Theor. 54, 474001 (2021), "Kinetic theory of Calogero particles"
57. J. Kethepalli, **M. Kulkarni**, A. Kundu, S. N. Majumdar, D. Mukamel, G. Schehr, J. Stat. Mech, 2021, 103209 (2021), "Harmonically confined long-ranged interacting gas in the presence of a hard wall"
56. A. K. Chatterjee, **M. Kulkarni**, A. Kundu, Phys. Rev. E 104, 044136 (2021), "Dynamical regimes of finite temperature discrete nonlinear Schrödinger chain"
55. R. Nimiwal, U. Satpathi, V. Vasan, **M. Kulkarni**, J. Phys. A: Math. Theor. 54, 425701 (2021), "Soliton-like behaviour in non-integrable systems"
54. B. Kiran, D. A. Huse, **M. Kulkarni**, Phys. Rev. E 104, 044117 (2021), "Spatio-temporal spread of perturbations in power-law models at low temperatures: Exact results for OTOC"
53. S. Roy, S. Mukerjee, **M. Kulkarni**, Phys. Rev. B 103, 184203 (2021), "Imbalance for a family of one-dimensional incommensurate models with mobility edges"
52. **M. Kulkarni**, S. N. Majumdar, G. Schehr, Phys. Rev. A 103, 033321 (2021), "Multi-layered density profile for noninteracting fermions in a rotating two-dimensional trap"
51. A. Prakash, J. H. Pixley, **M. Kulkarni**, Phys. Rev. Research 3, L012019, Letters (2021), Editors' Suggestion, "The universal spectral form factor for many-body localization"
50. C. Aron, **M. Kulkarni**, Phys. Rev. Research 2, 043390 (2020), "Non-Analytic Non-Equilibrium Field Theory: Stochastic Reheating of the Ising Model"

49. A. Dey, **M. Kulkarni**, Phys. Rev. Research 2, 042004, Rapid Communications (2020), "Emergence of chaos and controlled photon transfer in a cavity-QED network"
48. A. Purkayastha, **M. Kulkarni**, Y. N. Joglekar, Phys. Rev. Research 2, 043075 (2020), "Emergent PT symmetry in a double-quantum-dot circuit QED set-up"
47. A. K. Chatterjee, A. Kundu, **M. Kulkarni**, Phys. Rev. E 102, 052103 (2020), Editors' Suggestion, "Spatio-temporal spread of perturbations in a driven dissipative Duffing chain: an OTOC approach"
46. A. Dey, **M. Kulkarni**, Phys. Rev. A 101, 043801 (2020), "Engineering indefinitely long-lived localization in cavity-QED arrays"
45. S. Swarup, V. Vasan, **M. Kulkarni**, J. Phys. A: Math. Theor. 53, 135206 (2020), "Provable bounds for the Korteweg-de Vries reduction in multi-component Nonlinear Schrodinger Equation"
44. J. P. Deka, A. K. Sarma, A. Govindarajan, **M. Kulkarni**, Nonlinear Dynamics, 100 (2), 1629–1640 (2020), "Multifaceted nonlinear dynamics in PT-symmetric coupled Liénard oscillators"
43. A. Kumar, **M. Kulkarni**, A. Kundu, Phys. Rev. E 102, 032128 (2020), "Particles confined in arbitrary potentials with a class of finite-ranged interactions"
42. M. Kumar, A. Kundu, **M. Kulkarni**, D. A. Huse, A. Dhar, Phys. Rev. E 102, 022130 (2020), "Transport, correlations, and chaos in a classical disordered anharmonic chain"
41. S. Agarwal, A. Dhar, **M. Kulkarni**, A. Kundu, S. N. Majumdar, D. Mukamel, G. Schehr, Phys. Rev. Lett. 123, 100603 (2019), Editors' Suggestion, "Harmonically confined particles with long-range repulsive interactions"
40. A. Das, **M. Kulkarni**, H. Spohn, A. Dhar, Phys. Rev. E 100, 042116 (2019), "Kardar-Parisi-Zhang scaling for an integrable lattice Landau-Lifshitz spin chain"
39. A. K. Gon, **M. Kulkarni**, J. Phys. A: Math. Theor. 52, 415201 (2019), "Duality in a hyperbolic interaction model integrable even in a strong confinement: Multi-soliton solutions and field theory"
38. S. Agarwal, **M. Kulkarni**, A. Dhar, J. Stat Phys, 176, 6, 1463 (2019), "Some connections between the Classical Calogero-Moser model and the Log Gas"
37. B. K. Agarwalla, **M. Kulkarni**, D. Segal, Phys. Rev. B 100, 035412 (2019), "Photon statistics of a double quantum dot micromaser: Quantum treatment"
36. A. Das, K. Damle, A. Dhar, D. A. Huse, **M. Kulkarni**, C. B. Mendl, H. Spohn, J Stat Phys, 180(1), 238-262 (2019), "Nonlinear Fluctuating Hydrodynamics for the Classical XXZ Spin Chain"

35. J. Lu, R. Wang, J. Ren, **M. Kulkarni**, J-H. Jiang, Phys. Rev. B 99, 035129 (2019), "Quantum Dot circuit-QED thermoelectric diodes and transistors"
34. **M. Kulkarni**, G. Mandal, T. Morita, Phys. Rev. A 98, 043610 (2018), "Quantum quench and thermalization of one-dimensional Fermi gas via phase space hydrodynamics"
33. R. Hartle, C. Schinabeck, **M. Kulkarni**, D. Gelbwaser-Klimovsky, M. Thoss, U. Peskin, Phys. Rev. B 98, 081404, Rapid Communications (2018), "Cooling by heating in nonequilibrium nanosystems"
32. A. Purkayastha, S. Sanyal, A. Dhar, **M. Kulkarni**, Phys. Rev. B 97, 174206 (2018), Editors' Suggestion, "Anomalous transport in the Aubry-André-Harper model in isolated and open systems "
31. **M. Kulkarni**, S. M. Hein, E. Kapit, C. Aron, Phys. Rev. B 97, 064506 (2018), "Permanent spin currents in cavity-qubit systems"
30. A. Purkayastha, A. Dhar, **M. Kulkarni**, Phys. Rev. B 96, 180204, Rapid Communications, (2017), "Non-equilibrium phase diagram of a 1D quasiperiodic system with a single-particle mobility edge"
29. **M. Kulkarni**, A. P. Polychronakos, J. Phys. A: Math. Theor. 50 455202 (2017), "Emergence of Calogero family of models in external potentials: Duality, Solitons and Hydrodynamics"
28. A. Purkayastha, A. Dhar, **M. Kulkarni**, Phys. Rev. A 94, 052134, (2016), "Non-linear transport in an out-of-equilibrium single-site Bose Hubbard model: scaling, rectification and time dynamics"
27. B. K. Agarwalla, **M. Kulkarni**, S. Mukamel, D. Segal, Phys. Rev. B 94, 121305, Rapid Communications (2016), "Giant photon gain in large-scale quantum dot circuit-QED systems"
26. B. K. Agarwalla, **M. Kulkarni**, S. Mukamel, D. Segal, Phys. Rev. B 94, 035434 (2016), "Tunable photonic cavity coupled to a voltage-biased double quantum dot system: Diagrammatic nonequilibrium Green's function approach"
25. F. Franchini, **M. Kulkarni**, A. Trombettoni, New J. Phys. 18, 115003, (2016), "Hydrodynamics of local excitations after an interaction quench in 1D cold atomic gases"
24. C. Aron, **M. Kulkarni** and H. E. Tureci, Phys. Rev. X 6, 011032 (2016), "Photon-mediated interactions: a scalable tool to create and sustain entangled many-body states"
23. A. Purkayastha, A. Dhar, **M. Kulkarni**, Phys. Rev. A 93, 062114 (2016), "Exact Redfield description for open non-interacting quantum systems and failure of the Lindblad approach"



22. M. E. Schwartz, L. Martin, E. Flurin, C. Aron, **M. Kulkarni**, H. E. Tureci, I. Siddiqi, Phys. Rev. Lett. 116, 240503 (2016), "Stabilizing Entanglement via Symmetry-Selective Bath Engineering in Superconducting Qubits"
21. J-H. Jiang, **M. Kulkarni**, D. Segal, Y. Imry, Phys. Rev. B 92, 045309 (2015), "Phonon-thermoelectric transistors and rectifiers"
20. F. Franchini, A. Gromov, **M. Kulkarni**, A. Trombettoni, J. Phys. A: Math. Theor. 48 (2015) 28FT01 (Fast Track Communication) "Universal dynamics of a soliton after an interaction quench"
19. **M. Kulkarni**, D. A. Huse, H. Spohn, Phys. Rev. A 92, 043612 (2015), "Fluctuating hydrodynamics for a discrete Gross-Pitaevskii equation: mapping to Kardar-Parisi-Zhang universality class"
18. R. Hartle, **M. Kulkarni**, Phys. Rev. B 91, 245429 (2015), "Effect of broadening in the weak coupling limit of vibrationally coupled electron transport through molecular junctions and the analogy to quantum dot circuit QED systems"
17. C. Aron, **M. Kulkarni** and H. E. Tureci, Phys. Rev. A 90, 062305 (2014) "Steady-state entanglement of spatially separated qubits via quantum bath engineering"
16. **M. Kulkarni**, O. Cotlet and H. E. Tureci, Phys. Rev. B, 90, 125402 (2014) "Cavity-coupled double-quantum dot at finite bias: analogy with lasers and beyond"
15. **M. Kulkarni**, B. Oztop and H. E. Tureci, Phys. Rev. Lett, 111, 220408 (2013) "Cavity-mediated near-critical dissipative dynamics of a driven condensate"
14. **M. Kulkarni**, K. L. Tiwari and D. Segal, New Journal of Physics, 15, 013014 (2013) "Full density matrix dynamics for large quantum systems: interactions, decoherence and inelastic effects"
13. **M. Kulkarni** and A. Lamacraft, Phys. Rev. A 88, 021603, Rapid Communications (2013) "Finite-temperature dynamical structure factor of the one-dimensional Bose gas: From the Gross-Pitaevskii equation to the Kardar-Parisi-Zhang universality class of dynamical critical phenomena"
12. **M. Kulkarni**, K. L. Tiwari and D. Segal, Phys. Rev. B 86, 155424 (2012) "Towards equilibration and thermalization between finite quantum systems: Unitary emulation of dephasing effects and inelastic interactions"
11. **M. Kulkarni** and A. G. Abanov, Phys. Rev. A, 86, 033614 (2012) "Hydrodynamics of cold atomic gases in the limit of weak nonlinearity, dispersion, and dissipation"
10. J. Joseph, J. E. Thomas, **M. Kulkarni**, A. G. Abanov, Phys. Rev. Lett. 106, 150401 (2011) "Observation of shock waves in a strongly interacting Fermi gas"
9. **M. Kulkarni** and R. M. Konik, arXiv:1109.5731 (2011), "The Fermi liquid nature of the ground state of double quantum dots in parallel from a  $1/N$  expansion"

8. A. G. Abanov, A. Gromov, **M. Kulkarni**, J. Phys. A: Math. Theor. 44 ,295203 (2011) "Soliton solutions of Calogero model in harmonic potential"
7. S. Ganeshan, **M. Kulkarni** and A. C. Durst, Phys. Rev. B 84, 064503 (2011) "Quasi-particle scattering from vortices in d-wave superconductors. II. Berry phase contribution"
6. **M. Kulkarni** and A. G. Abanov, Nucl. Phys. B, 846, 122 (2011) "Cold Fermi gas with inverse square interaction in a harmonic trap"
5. **M. Kulkarni** and R. M. Konik, Phys. Rev. B 83, 245121 (2011) "The RKKY Interaction and the Nature of the Ground State of Double Quantum Dots in Parallel"
4. **M. Kulkarni**, S. Ganeshan and A. C. Durst, Phys. Rev. B 84, 064502 (2011) "Quasi-particle scattering from vortices in d-wave superconductors I: Superflow contribution"
3. F. Franchini and **M. Kulkarni**, Nucl. Phys. B, 825, 320 (2010) "Emptiness and Depletion Formation Probability in spin models with inverse square interaction"
2. **M. Kulkarni**, F. Franchini and A. G. Abanov, Phys. Rev. B 80, 165105 (2009) "Nonlinear dynamics of spin and charge in spin-Calogero model"
1. **M. Kulkarni**, N. Seshadri, V. S. C. Manga Rao, S. Dutta Gupta, Journal of Modern Optics, 10, Volume 51 No. 4, 549-557 "Control of superluminal transit through a heterogeneous medium"

## Recent Research Interests

My recent research interests can be broadly classified as

- Open Quantum Systems
  - Development of theoretical and computational techniques in driven-dissipative quantum systems
  - Transport and correlations
  - Connections to non-Hermitian Random Matrix Theory
  - Quantum Resetting
  - Hamiltonian and Bath Engineering
  - Preparation of non-trivial non-equilibrium steady states (for e.g., entangled many body states)
  - Localization (self-trapping), Chaos, Quantum State Transfer in Open Quantum Systems
- Low dimensional systems

- Quasi-periodic and disordered systems
- Nonlinear Hydrodynamics, Shock Waves, Quenches
- Dynamical Critical Phenomenon, Universalities, Connections to Random Matrix Theory
- Many Body Localization
- Spatio-temporal spread of perturbations, Out-of-Time-Order Commutators (OTOC)
- Large-N theory of low dimensional systems (for e.g., power law models)
- Fluctuations, Correlations and Large Deviations in interacting many particle systems
- Cold Atomic Systems
- Integrable systems, field theory and mathematical physics
  - Field theory of integrable models
  - Solitons, Dualities
  - Generalised Hydrodynamics
  - Stochastic and Deterministic PDE's (KPZ, NLS, KdV, Burgers, Riemann-Hopf equations and generalizations)
  - Mathematical techniques for reduction of complex dynamics to chiral field theories

## Teaching

- ICTS course on Open Quantum Systems (Spring 2017)
- ICTS course on Classical Mechanics (Fall 2018)
- ICTS course on Classical Mechanics (Fall 2019)
- ICTS course on Open Quantum Systems (Spring 2021)
- Lectures in Open Quantum Systems, 12th Bangalore School on Statistical Physics (2021), The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 28 June - 9 July, 2021
- ICTS course on Open Quantum Systems (Spring 2022)
- Non-Equilibrium Dynamics with Light and Matter, King's College London (Master-classes, September 2022)
- Theory of Open Quantum Systems (Spring 2023)
- Theory of Open Quantum Systems (Spring 2024)
- ICTS course on Classical Mechanics (Fall 2025)

## **Current Group Members**

- Madhumita Saha, Postdoctoral Fellow
- Debojyoti Kundu, Postdoctoral Fellow
- Rekha Kumari, Postdoctoral Fellow
- Indranil Mukherjee, Postdoctoral Fellow
- Sparsh Gupta, Graduate Student
- Tamoghna Ray, Graduate Student
- Atharva Naik, Graduate Student
- Soumyadeep Sarma, Project Student
- Sunidhi Sen, Visitor, Graduate Student, Co-advisor

## **Ex-Members [next affiliation]**

- Manoj Kumar, Postdoctoral Fellow [Newton International Fellow, Coventry University, U.K.]
- Jincheng Lu, Project Student [Graduate student, Soochow University, China]
- Svetlana Swarup, Project Student [Graduate student, University of Minnesota, USA]
- Sanaa Agarwal, Masters Student [Graduate student, University of Colorado, USA]
- Sayantan Roy, Masters Student [Graduate student, Ohio State University, USA]
- Aritra Kumar Gon, Project Student [Graduate Student, TIFR Mumbai, India]
- Abhinav Sundar, IASc. Summer Fellow [Texas Instruments]
- Anant Rastogi, Project Student [Graduate student, University of Minnesota, USA]
- Archak Purkayashta, Graduate Student Co-advisor [Marie Skłodowska-Curie Actions Individual Fellow, Trinity College Dublin, Ireland]
- Aman Agarwal, Masters Student [Graduate Student, Perimeter Institute and the University of Guelph, Canada]
- Amit Dey, Postdoctoral Fellow [Assistant Professor, Ramananda College, Bankura University, India]
- Avanish Kumar, Long Term Visitor [Postdoctoral Fellow, Weizmann Institute, Israel]
- Raghavendra Nimiwal, Masters Student [Graduate Student, Columbia University]

- Devashish Tupkary, Project Student [Graduate Student, Institute for Quantum Computing, University of Waterloo, Canada]
- Abhishodh Prakash, ICTS-Simons Postdoctoral Fellow [Postdoctoral Fellow, University of Oxford, U.K]
- Urbashi Satpathi, Postdoctoral Fellow [Postdoctoral Fellow, Ben Gurion University, Israel]
- Amit Kumar Chatterjee, Postdoctoral Fellow [Postdoctoral Fellow, Yukawa Institute for Theoretical Physics, Kyoto University, Japan]
- Hari Kumar Yadalam, CEFIPRA Postdoctoral Fellow [Postdoctoral Fellow, University of California, Irvine, USA]
- Debarshee Bagchi, Postdoctoral Fellow [Product Engineer, VLabs, Bangalore]
- Bishal Ghosh, Masters student, thesis co-advisor [Graduate student, The University of Texas at Dallas, USA]
- Shreyas Raman, Project Student [Graduate student, Boston University, USA]
- Dipankar Roy, Postdoctoral Fellow [Postdoctoral Fellow, Laboratoire Jean Alexandre Dieudonné, Université Côte d'Azur, France]
- Soumi Ghosh, Postdoctoral Fellow [Postdoctoral Fellow, KTH Royal Institute of Technology, Stockholm, Sweden]
- Jitendra Kethepalli, Graduate Student Co-advisor [Postdoctoral Fellow, LPTM - Cergy Paris Université, France]
- Preethi Gopalakrishnan, Project Student [Graduate student, University of Luxembourg, Luxembourg]
- Saikat Santra, Graduate Student Co-advisor [Postdoctoral Fellow, Faculty of Physics, University of Warsaw, Poland]
- Mahaveer Prasad, Graduate Student [Postdoctoral Fellow, Singapore University of Technology and Design, Singapore]

### **Invited talks at conferences and institutions**

- Non-Hermitian random matrix ensembles, singular values and open quantum systems, Department of Physics, National University of Singapore, SINGAPORE, 4 November, 2025
- Broad overview of some works and interests in Quantum, Quantum Lab at Fujitsu Research India, Bangalore, INDIA, 24 October, 2025

- Non-Hermitian random matrix ensembles, singular values and open quantum systems, 22nd International Workshop on Pseudo-Hermitian Hamiltonians in Quantum Physics (PHHQP-XXII) conference, Department of Physics, University of Crete, Heraklion GREECE, 13 October - 17 October, 2025.
- Anomalous transport in long-ranged open quantum systems, Long-Range Interactions and Dynamics in Complex Quantum Systems (satellite meeting of Statphys29) Long-Range Interactions and Dynamics in Complex Quantum Systems (satellite meeting of Statphys29), Nordita, Stockholm, SWEDEN, July 23 - 25 July, 2025.
- Quantum dynamics and entanglement in open systems, Workshop on Hydrodynamics of low-dimensional interacting systems: Advances, challenges, and future directions, Yukawa Institute for Theoretical Physics, Kyoto University, JAPAN, June 2 - June 13, 2025
- Dynamics of entanglement in interacting quantum systems, Conference on Effective theories for many-body systems out of equilibrium at The SwissMAP Research Station in Les Diablerets, SWITZERLAND, May 11, 2025 to May 16, 2025
- Quantum trajectories and Page-curve entanglement, IISER Pune, INDIA, March 19, 2025.
- Lectures on Open Quantum Systems, School of Physical Sciences Indian Association for the Cultivation of Science, Kolkata, INDIA, March 02 - March 06, 2025
- Quantum trajectories and Page-curve entanglement, Program on Quantum Trajectories, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 20 January - 07 February 2025
- Non-Hermitian random matrix ensembles, singular values and open quantum systems, Initiative for Theoretical Sciences, Graduate Center, City University of New York USA, November 8, 2024.
- Non-Hermitian random matrix ensembles and open quantum systems, Department of Physics, IIT Kanpur, INDIA, September 26, 2024.
- Entanglement and First detection probability via Quantum Resetting, Workshop: New Vistas in Stochastic Resetting, The Higgs Centre for Theoretical Physics, University of Edinburgh, Edinburgh, UK, June 17 - June 19, 2024
- Collective behaviour of a family of power law models, Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), Heraklion, GREECE, April 25, 2024.
- Ergodic and chaotic properties in isolated and open Tavis-Cummings systems: Quantum and Classical limits, IISER Pune, INDIA, February 22, 2024.

- Stability of quantum matter with deformed Lindbladians, Program on Stability of Quantum Matter in and out of Equilibrium at Various Scales, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 15 - 26 January 2024
- Random matrix theory and open quantum system, EPFL Lausanne, SWITZERLAND, December 12, 2023.
- Collective behaviour of a family of power law models, Conference on Frontiers in Statistical Physics, Raman Research Institute, INDIA, December 4 - 8, 2023.
- Random matrix theory and open quantum system, Conference on Emerging Topics in Quantum Technology (ETQT-2023), IIT Palakkad, INDIA, November 2 - 4, 2023.
- Collective Behaviour of a Family of Power Law Models, Department of Mathematics of the Technical University of Munich, Garching, GERMANY, October 24, 2023.
- Lindblad descriptions of systems weakly coupled to baths: Consistency and limitations, Soochow University, Suzhou, CHINA, September 4, 2023.
- Random matrix theory and non-Hermitian systems, King's College, London, UK, August 9, 2023.
- Collective Behaviour of a Family of Power Law Models, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, August 1, 2023.
- Collective Behaviour of a Family of Power Law Models, Department of Physics, School of Physical Sciences, Jawaharlal Nehru University, INDIA, May 8, 2023.
- Random matrix theory and open quantum systems, Colloquium, Harish-Chandra Research Institute (HRI), INDIA, April 17, 2023.
- Random matrix theory and open quantum systems, Theoretical Physics Colloquium, Department of Theoretical Physics, Tata Institute of Fundamental Research (TIFR) Mumbai, INDIA, March 14, 2023.
- Open Quantum Systems: Techniques and Applications, CMP/QFT Meeting, Institute for Advanced Study, Princeton, USA, January 30, 2023.
- Collective behaviour of a family of power law models, Princeton University, USA, January 24, 2023
- Anomalous transport at band edges, Dynamics Days Asia Pacific (DDAP12), Center for Theoretical Physics of Complex Systems (PCS) of the Institute for Basic Science (IBS), Daejeon, SOUTH KOREA. November 7 - 11, 2022
- Non-Hermitian random matrices and open quantum systems, Colloquium, City College of the City University of New York, New York, USA, October 26, 2022

- Spectral properties of open quantum systems and connections to non-Hermitian random matrices, Department of Physics and Astronomy, Rutgers University, USA, October 18, 2022
- Spectral Properties of Non-Hermitian Systems, I-HUB Quantum Technology Foundation, IISER Pune, INDIA, September 16, 2022.
- Non-Equilibrium Dynamics with Light and Matter (online Masterclasses), King's College LONDON, September 5-7, 2022
- Localisation and Chaos in isolated and open quantum systems, Bharathidasan University, Tiruchirappalli, INDIA, June 8, 2022
- Engineering Exotic States of Light and Matter, Keynote Speaker, PGGCG, Chandigarh, INDIA, May 27, 2022
- Engineering Exotic States of Light and Matter, Mehr Chand Mahajan DAV College for Women, Chandigarh, INDIA, May 21, 2022
- Collective description of trapped fermions: Exact results, Ecole Normale Supérieure, Paris, FRANCE, December 9, 2021
- Localization and spectral signatures in isolated and open quantum systems, Young Investigator Meet on Quantum Condensed Matter Theory, NISER, Bhubaneswar, INDIA, November 16 to November 19, 2021
- Collective behaviour of a family of power law models, Workshop on Hydrodynamics and fluctuations - microscopic approaches in condensed matter systems, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, September 6-10, 2021
- Soliton-like behaviour in non-integrable systems, Conference of Analytic and algebraic methods in physics XVIII, Prague, Czech Republic, September 1-3, 2021
- Localization and spectral signatures in isolated and open quantum systems, University of Luxembourg, July 13, 2021, LUXEMBOURG
- Localisation, Quantum State Transfer and emergent PT symmetry in non-Hermitian systems, Summer School on Quantum Information and Quantum Technology -2021, IISER Kolkata, INDIA, 14 June 2021 - 17 July 2021
- Lectures in Open Quantum Systems, 12th Bangalore School on Statistical Physics (2021), The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 28 June - 9 July, 2021
- Collective description of trapped fermions: Exact results, McMaster University, CANADA, June 25, 2021
- Localization and spectral signatures in isolated and open quantum systems, Université de Genève, SWITZERLAND, May 25, 2021



- Localisation and Quantum State Transfer in non-Hermitian systems, Program on Non-Hermitian Physics, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 12 March 2021 to 26 March 2021
- Family of long-ranged models: Collective behavior and dynamics, Physics Colloquium, IISER Pune, INDIA, March 8, 2021
- "Localisation and Quantum State Transfer in a cavity-QED network", Freie Universität Berlin, GERMANY, January 14, 2021
- "Localisation and Quantum State Transfer in a cavity-QED network", Young Investigator Meet on Quantum Condensed Matter Theory, NISER, Bhubaneswar, INDIA, December 15 to December 18, 2020
- "Exotic states of light and matter", Azim Premji University, Bangalore, INDIA, November 3, 2020
- Panelist in two panels, (i) Quantum Materials and Devices horizontal and (ii) Quantum computing horizontal: Theory and Algorithms, Vaibhav Summit (Government of India), INDIA, October 3 to October, 25, 2020
- "Transport and Localization in quasi-periodic and disordered Hamiltonians: Open and Closed Systems", 2020 International Conference on Thermodynamics and Thermal Metamaterials, CHINA, August 7- August 9, 2020
- "Family of long-ranged models: Collective behaviour and dynamics", 31st Mid-Year Meeting, Indian Academy of Sciences, Bangalore, INDIA, July 3 - July 4, 2020
- "Localization in quasi-periodic and disordered Hamiltonians: Open and Closed Systems", Colloquium at Department of Physics, University of Crete, GREECE, February 13, 2020.
- "Large-N field theory of confined particles with repulsive interaction", Department of Physics and Astronomy, Rutgers University, New Jersey, USA, January 16, 2020
- "Kardar Parisi Zhang (KPZ) scaling in non-integrable and integrable classical models", Program on Thermalization, Many body localization and Hydrodynamics, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 11 November 2019 to 29 November 2019
- "Kardar Parisi Zhang (KPZ) scaling in non-integrable and integrable classical spin chains", Department of Physics, University of Tokyo, JAPAN, September 25, 2019
- "PT symmetry in a Double Quantum Dot circuit-QED set-up", META 2019, 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics, Lisbon, PORTUGAL, July 23, 2019 to July 26, 2019.

- "Kardar Parisi Zhang (KPZ) scaling in non-integrable and integrable classical spin chains", 2nd Conference on Quantum Condensed Matter (QMat2019) in IISc, Bangalore, INDIA, July 8, 2019 to July 10, 2019.
- Engineered Driven-Dissipative Quantum Systems and Quantum Devices, Aspen Center for Physics, Program on Active and Driven Matter: Connecting Quantum and Classical Systems, Colorado, USA, June 09, 2019 to June 30, 2019
- Mesoscopic Quantum Optics: Fundamental Aspects to device applications, Solid-State Quantum Computation Group Key Lab of Quantum Information, CAS, University of Science and Technology of China, Hefei, CHINA, April 18, 2019.
- Connections between Classical Integrable Models, Log Gas, and Random Matrix Theory, Ecole Normale Supérieure, Paris, FRANCE, March 27, 2019
- Duality in a model integrable even in a box-like confinement: Multi-soliton solutions and field theory, Université de Paris-Sud (Orsay), Paris, FRANCE, March 18, 2019.
- Mesoscopic Quantum Optics: Fundamental Aspects and Device Applications, "Conference on Quantum Information and Many-Body Theory", Indian Institute of Technology (BHU), INDIA, March 1-3, 2019.
- Mesoscopic Quantum Optics: Fundamental Aspects and Device Applications, Department of Physics, Indian Institute of Technology Bombay, Mumbai, INDIA, February 7, 2019
- Connections between Classical Integrable Models, Log Gas and Random Matrix Theory, Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, February 5, 2019
- Connections between Classical Calogero-Moser, Log Gas and Random Matrix Theory, Program on Universality in random structures: Interfaces, Matrices, Sandpiles, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 14 January 2019 to 08 February 2019
- Mesoscopic Quantum Optics: Fundamental Aspects and Device Applications, International conference on Quantum and Atom Optics (ICQAO-2018)", IIT Patna, INDIA, December 16-18, 2018
- Quantum-dot circuit-QED systems: From fundamental aspects to device applications, Young Investigator Meet on Quantum Condensed Matter Theory, S. N. Bose National Centre for Basic Sciences, Kolkata, INDIA, November 20 - 22, 2018
- Emergence of integrable models in external potentials: Duality, Solitons and Field theory, Department of Physics, Brown University, USA, October 15 2018
- Integrability with confined potentials: Duality, Solitons, Field Theory and Growth of Perturbations, Program on Integrable systems in Mathematics, Condensed Matter and Statistical Physics, The International Centre for Theoretical Sciences (ICTS) of

the Tata Institute of Fundamental Research, Bangalore, INDIA, 16 July 2018 to 10 August 2018

- Non-Hermitian Quantum Systems as Quantum Devices, Program on Non-Hermitian Physics - PHHQP XVIII, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 04 June 2018 to 13 June 2018
- Connections between Gross-Pitaevskii equation, Kardar-Parisi-Zhang and the Korteweg-de Vries equation, School of Physical Science and Technology, Soochow University, Suzhou, CHINA, May 25, 2018
- Connections between Gross-Pitaevskii equation, Kardar-Parisi-Zhang and the Korteweg-de Vries equation, Department of Physics, Yale University, USA, May 4, 2018
- Out-of-equilibrium incommensurate lattice models, Center for Theoretical Physics (City Tech), Department of Physics, City University of New York, NY, USA, April 26, 2018
- Open Quantum Systems: Time Dynamics and Steady States, Department of Mathematics, Mathematical Physics Seminar, Rutgers University, New Jersey, USA, April 19th, 2018
- Emergence of integrable models in external potentials: Duality, Solitons and Field theory, Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, April 9, 2018
- Nonlinear dynamics: From integrable models to cold atomic gases, Conference on Recent Trends in Cold and Ultracold Matter, IIT Guwahati, INDIA, March 27-29, 2018
- Permanent spin currents and entanglement in cavity-qubit systems, Conference on Emergent phenomenon in classical and quantum systems, S. N. Bose National Centre for Basic Sciences, Kolkata, INDIA, Feb 26-28, 2018
- Photon gain and statistics in driven quantum dot circuit-QED systems, Conference on Driven Quantum Systems, Indian Association for the Cultivation of Science (IACS), Kolkata, INDIA, Feb 19 -21, 2018
- Nonlinear dynamics: From integrable models to cold atomic gases, Indian Institute of Technology, IIT - Kanpur, INDIA, Feb 9, 2018
- Driven Incommensurate lattice models in low dimensions, The Institute of Mathematical Sciences (IMSc), Chennai, INDIA, Jan 2, 2018
- Universality in driven incommensurate models, Department of Physics, New York University, USA, Dec 8, 2017.

- Permanent spin currents and entanglement in cavity-qubit systems, Yale Quantum Institute, Yale University, USA, Nov 30, 2017
- Open quantum system generalization of Incommensurate lattice models in low dimensions, Conference on Progress in quantum collective phenomena – from MBL to black holes, Simons Center for Geometry and Physics, Stony Brook, USA, November 13 - 17, 2017
- Incommensurate lattice models in low dimensions with and without mobility edge, Department of Physics, McMaster University, CANADA, November 1, 2017
- Non-equilibrium phase diagram of a 1D quasiperiodic system with a single-particle mobility edge, Chemical Physics Theory Group, Department of Chemistry, University of Toronto, CANADA, November 8, 2017
- An open quantum system generalization of a 1D quasiperiodic system with a single-particle mobility edge, Center for Phononics and Thermal Energy Science, Tongji University, Shanghai, CHINA, September 18, 2017
- Permanent spin currents and entanglement in cavity-qubit systems, Quantum Workshop, Suzhou, CHINA, September 15-17, 2017
- Engineering exotic states of light and matter, The Einstein Public Lecture at M S Ramaiah Institute of Technology, Bangalore, INDIA, September 8, 2017
- An open quantum system generalization of a 1D quasiperiodic system with a single-particle mobility edge, Program on Open Quantum Systems, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bangalore, INDIA, 17 July to 04 August 2017
- Sub-diffusion and Non-equilibrium Probes of Phases in Aubry-Andre-Harper Model ,Conference on Many-Body-Localization: Advances in the Theory and Experimental Progress, ICTP, Trieste, ITALY, 10 -14 July 2017.
- Sub-diffusion and non-equilibrium probes of phases in incommensurate lattice models in low dimensions, TIFR Centre for Interdisciplinary Sciences, Hyderabad, INDIA, June 23, 2017
- Recent progress in non-equilibrium physics with Light and Matter, 35th Samahang Pisika ng Pilipinas Physics Conference , Cebu City, PHILIPPINES, 7-10 June 2017.
- Sub-diffusion and non-equilibrium probes of phases in incommensurate lattice models in low dimensions, Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, May 18, 2017
- Sub-diffusion and non-equilibrium probes of phases in Aubry-André-Harper Model, Conference on Dynamics and Hydrodynamics of Certain Quantum Matter, Graduate Centre of CUNY, New York, USA, March 22, 2017

- Driven-Dissipative Quantum-Dot Circuit-QED systems: Diagrammatic Keldysh Approach, Department of Physics at City College of the City University of New York, New York, USA, March 22, 2017
- Driven-Dissipative Quantum-dot circuit-QED systems, International Conference on Complex Quantum Systems, Bhabha Atomic Research Centre, Mumbai, INDIA, February 20-23, 2017
- Entanglement in light-matter systems, The Institute of Mathematical Sciences (IMSc), Chennai, INDIA, February 2, 2017
- Entanglement in light-matter systems, School of Physics and Astronomy, Shanghai Jiao Tong University, Shanghai, CHINA, December 22, 2016
- Entanglement in light-matter systems, School of Physical Science and Technology, Soochow University, Suzhou, CHINA, December 19, 2016
- Entanglement in light-matter systems, TIFR Centre for Interdisciplinary Sciences, Hyderabad, INDIA, August 11, 2016
- On Duality, Solitons and Quenches in Generalized Calogero Models in upto-Quartic Polynomial Potentials Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, August 8, 2016
- Entanglement in large-scale light-matter systems Quantum Materials Seminar Series, Advanced Science Research Center, CUNY, NY, USA, June 21, 2016
- Hydrodynamics of local excitations after an interaction quench in 1D cold atomic gases Atomic and Molecular Optics Seminar at Department of Physics and Astronomy, SUNY Stony Brook, NY, USA, May 9, 2016
- Quantum Bath Engineering of large-scale hybrid quantum systems Seminar at Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, CANADA, April 28, 2016
- Lecture on Hybrid Quantum Systems Department of Chemistry, University of Toronto, CANADA, April 26, 2016
- Photon-Mediated Interactions: A Scalable Tool to Create and Sustain Entangled States of N Atoms Hunter College of City University of New York, New York, USA, April 20, 2016
- Creating and Sustaining Entangled States of N-Qubits using Noise and Dissipation Princeton- Texas A&M University Symposium on Quantum Noise Effects in Thermodynamics, Biology and Information, Princeton University, New Jersey, USA, April 14-16, 2016
- Effective chiral description of an exciton-polariton superfluid in one and two dimensions APS March Meeting 2016, Baltimore, MD, March 14–18, 2016

- M.Kulkarni, Generating entanglement and exotic phases in Open Quantum Systems, High Energy Physics Seminar, Department of Physics at City College of the City University of New York, New York, February 19, 2016
- M.Kulkarni, Hamiltonian and Reservoir Engineering in Hybrid Quantum Systems, Hunter College of the City University of New York, New York, February 17, 2016
- M. Kulkarni, A deep connection between Nonlinear Schrodinger Equation, Nonlinear Fluctuating Hydrodynamics and the Kardar-Parisi-Zhang Universality Class , Centre of Quantum Materials and Condensed Matter Physics at Department of Physics and Astronomy, Stony Brook University, USA, February 12, 2016
- M.Kulkarni, Lecture on Cavity Optomechanics Chemical Physics Theory Group, Department of Chemistry University of Toronto, CANADA, February 9, 2016
- M.Kulkarni, Generating entanglement via Hamiltonian and Reservoir engineering in superconducting qubits Special seminar at Chemical Physics Theory Group of Department of Chemistry, University of Toronto, CANADA, December 10, 2016
- M. Kulkarni, The Nonlinear Schrodinger Equation, Nonlinear Fluctuating Hydrodynamics and the Kardar-Parisi-Zhang Universality Class". Invited talk at workshop on "Non-equilibrium Statistical Physics" at The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bengaluru, INDIA, October 26-November 20, 2015
- M.Kulkarni, "Nonlinear driven dissipative systems: Dynamics, Entanglement and Correlations", The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bengaluru, INDIA, 28 July, 2015 and Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, July 28, 2015.
- M. Kulkarni, "The Nonlinear Schrodinger Equation and the Kardar-Parisi-Zhang Universality Class: Connections, Implications and Applications.", Emergent Paradigms in Nonlinear Complexity: From PT-Symmetry to Nonlinear Dirac Systems, From Polaritons to Skyrmions", Center for Nonlinear Studies, Los Alamos National Laboratory, La Fonda Hotel and Santa Fe Institute, Santa Fe, New Mexico, June 8-10, 2015, USA
- M. Kulkarni, "Steady-state entanglement of spatially separated qubits via quantum bath engineering", Princeton-TAMU Workshop on Classical-Quantum Interface, May 27-29, 2015, Princeton University, New Jersey, USA.
- 9th Annual CUNY - City Tech Research Conference " Creating long-lived entangled states of matter by using light", City University of New York, USA, May 1, 2015
- M. Kulkarni, "Fluctuating hydrodynamics for a discrete nonlinear Schrodinger equation: mapping to Kardar-Parisi-Zhang universality class", The Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, April 01-04, 2015, Georgia, USA.

- M. Kulkarni, “Exotic phenomena in coupled light-matter systems: Entanglement and quantum transport ”, The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bengaluru, INDIA, Tuesday, January 20, 2015
- M. Kulkarni, “Aspects of non-equilibrium many-body phenomena in quantum matter and light”, Department of Physics, The Indian Institute of Technology Hyderabad, INDIA. Thursday, January 15, 2015
- M. Kulkarni, “Aspects of non-equilibrium many-body phenomena in quantum matter and light”, Centre for Quantum Information and Quantum Control, University of Toronto, CANADA, Monday, Dec 01, 2014
- M. Kulkarni, “Aspects of non-equilibrium many-body phenomena in quantum matter and light”, William I. Fine Theoretical Physics Institute of University of Minnesota, Minneapolis, USA Friday, September 26th 2014
- Department of Physics, University of Wisconsin, Madison, September 2013, USA
- Non-Equilibrium Bosons: from Driven Condensates to Non-Linear Optics, ICTP, Trieste, August 2013, ITALY
- Texas A & M - Casper College Summer School on Quantum Science and Engineering, July 2013, USA
- Workshop on Equilibration and Thermalization in Quantum systems, Stellenbosch, April 2013, SOUTH AFRICA
- Pacific Institute of Theoretical Physics, University of British Columbia, July 2012, CANADA
- Department of Physics, University of Waterloo, April 2012, CANADA
- Frontiers of quantum condensed matter physics: light, matter and unusual devices out of equilibrium, New York City, March 2012, USA
- Department of Physics, Stony Brook University, March 2012, USA
- Department of Physics, University of Toronto, Nov 2011, CANADA
- Department of Physics, McMaster University, Nov 2011, CANADA
- Department of Physics, University of Virginia, Jan 2011, USA
- Department of Physics, Rice University, Jan 2011, USA
- Department of Physics, Boston University, October 2010, USA
- Department of Physics, City University of New York, October 2010, USA
- Department of Physics, Duke University, May 2010, USA

### **Contributed talks at conferences**

- M. Kulkarni, S. Hein, E. Kapit, C. Aron “Quantum Bath Engineering of Permanent Chiral Currents in Cavity-Qubit Systems” American Physical Society March Meeting March 13-17, 2017, New Orleans, Louisiana, USA
- B. Agarwalla, M. Kulkarni, S. Mukamel, D. Segal “Giant photon gain in large-scale quantum circuit-QED systems: Diagrammatic non-equilibrium Green’s function approach” American Physical Society March Meeting March 13-17, 2017, New Orleans, Louisiana, USA
- M. Kulkarni, G. Kolmakov “Effective chiral description of an exciton-polariton superfluid in one and two dimensions”, American Physical Society March Meeting March 14-18, 2016, Baltimore, Maryland, USA
- C. Aron, M. Kulkarni, H. Tureci “Photon-mediated interactions: a scalable tool to create and sustain entangled states of N atoms”, American Physical Society March Meeting March 14-18, 2016, Baltimore, Maryland, USA
- R. Hartle, M. Kulkarni “Effect of broadening in the weak coupling limit of vibrationally coupled electron transport through molecular junctions and the analogy to quantum dot circuit QED systems”, American Physical Society March Meeting March 14-18, 2016, Baltimore, Maryland, USA
- O. Cotlet, M. Kulkarni, H. E. Tureci “Cavity-coupled double-quantum dot at finite bias: analogy with lasers and beyond”, American Physical Society March Meeting March 2-6, 2015, San Antonio, Texas, USA
- K. Makris, M. Kulkarni, H. E. Tureci “Dynamics of a driven quantum gas: Non-hermiticity, pseudo-spectra and phase transitions”, American Physical Society March Meeting March 2-6, 2015, San Antonio, Texas, USA
- M. Kulkarni, G. V. Kolmakov “Nonlinear, driven-dissipative hydrodynamics and effective chiral description of an exciton-polariton superfluid”, American Physical Society March Meeting March 2-6, 2015, San Antonio, Texas, USA
- A. Trombettoni , F. Franchini , A. Gromov, M. Kulkarni “Universal dynamics of a soliton after a quantum quench”, American Physical Society March Meeting March 2-6, 2015, San Antonio, Texas, USA

### **Programs/Workshops Organized**

- Open Quantum Systems 17 July 2017 to 04 August 2017, ICTS-TIFR, Bangalore, INDIA
- Non-Hermitian Physics - PHHQP XVIII, 04 June 2018 to 13 June 2018, ICTS-TIFR, Bangalore, INDIA



- Integrable systems in Mathematics, Condensed Matter and Statistical Physics, 16 July 2018 to 10 August 2018, ICTS-TIFR, Bangalore, INDIA
- Non-Hermitian Physics, 22 March - 26 March, 2021, ICTS-TIFR, Bangalore, INDIA
- Session Organiser in META 2020, 11th International Conference on Metamaterials, Photonic Crystals and Plasmonics, 20 July 2021 to 23 July 2021, Warsaw, POLAND
- Periodically and Quasi-Periodically Driven Complex Systems, June 12, 2023 - June 23, 2023, ICTS-TIFR, Bangalore, INDIA
- Quantum Many-Body Physics in the Age of Quantum Information, 25 November 2024 to 29 November 2024, ICTS-TIFR, Bangalore, INDIA
- Indo-French workshop on Classical and quantum dynamics in out of equilibrium systems, 16 December 2024 to 20 December 2024, ICTS-TIFR, Bangalore, INDIA

### **Institute Visits**

- Department of Physics, National University of Singapore, SINGAPORE, November 2 - November 8, 2025
- Department of Physics, University of Crete (UOC) and the Institute of Electronic Structure and Laser (IESL) - FORTH, Heraklion, GREECE, October 11 - October 18, 2025
- LPTMS (Paris-Saclay), FRANCE, September 05 - September 19, 2025
- Department of Physics, University of Crete (UOC) and the Institute of Electronic Structure and Laser (IESL) - FORTH, Heraklion, GREECE, July 12 - July 22, 2025
- EPFL, Lausanne, SWITZERLAND, July 7, 2025 to July 11, 2025.
- Yukawa Institute for Theoretical Physics, Kyoto University, JAPAN, June 2, 2025 to June 13, 2025.
- EPFL, Lausanne, SWITZERLAND, April 29, 2025 to May 11, 2025.
- Department of Physics, IISER Pune, INDIA, March 17 - March 21, 2025
- School of Physical Sciences Indian Association for the Cultivation of Science, Kolkata, INDIA, March 02 - March 06, 2025
- EPFL, Lausanne, SWITZERLAND, November 30, 2024 - December 9, 2024.
- Initiative for Theoretical Sciences, Graduate Center, City University of New York and Department of Physics, Princeton University, USA, October 20, 2024 to November 9, 2024.
- Department of Physics, IIT Kanpur, INDIA, September 16 - September 27, 2024

- Department of Physics, IISER Pune, INDIA, August 11 - August 17, 2024
- LPTMS (Paris-Saclay), FRANCE, June 03 - June 29, 2024
- Department of Physics, University of Crete (UOC) and the Institute of Electronic Structure and Laser (IESL) - FORTH, Heraklion, GREECE, May 27 - June 3, 2024
- Department of Physics, University of Crete, GREECE, April 18 - 28, 2024
- Department of Physics, Princeton University, USA, March 21 - April 3, 2024
- EPFL, Lausanne, SWITZERLAND, December 11 - 20, 2023.
- Department of Mathematics of the Technical University of Munich, Garching, GERMANY, October 9-25, 2023.
- Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, July 3 - August 25, 2023
- LPENS (Paris), LPTHE (Paris) and LPTMS (Paris-Saclay), FRANCE, May 11 - June 9, 2023
- Department of Physics, Princeton University, USA, Jan 1 - 31, 2023
- Department of Physics and Astronomy, Rutgers, New Jersey, USA, Oct 1 - 31, 2022
- Department of Physics, IISER Pune, INDIA, September 11 - 17, 2022
- Ecole Normale Supérieure, Paris, FRANCE, June 30 - July 31, 2022
- Ecole Normale Supérieure, Paris, FRANCE, Feb 11 - March 15, 2022
- Ecole Normale Supérieure, Paris, FRANCE, December 03 - 21, 2021
- Ecole Normale Supérieure, Paris, FRANCE, Feb 1 - 22, 2020
- Department of Physics, New York University, USA, Dec 28, 2019 to Jan 31, 2020
- Department of Physics, Princeton University, USA, Dec 28, 2019 to Jan 31, 2020
- Department of Physics, Graduate School of Science, University of Tokyo, JAPAN, September 23, 2019 to October 2, 2019
- Aspen Center for Physics, Program on Active and Driven Matter: Connecting Quantum and Classical Systems, Colorado, USA, June 09, 2019 to June 30, 2019
- Galileo Galilei Institute for Theoretical Physics, Workshop on Breakdown Of Ergodicity In Isolated Quantum Systems: From Glassiness To Localization, Florence, ITALY, May, 20 2019 - June, 9, 2019
- School of Physical Science and Technology, Soochow University, Suzhou, CHINA, April 15-23, 2019

- Ecole Normale Supérieure, Paris, FRANCE, March 13 - 30, 2019
- Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, February 4-9, 2019.
- Department of Physics, Princeton University, USA, October 4- 27, 2018
- School of Physical Science and Technology, Soochow University, Suzhou, CHINA, May 20-June 2, 2018
- Department of Physics, Princeton University, USA, April 10 - May 9, 2018
- The Institute of Mathematical Sciences (IMSc), Chennai, INDIA, January 1 - January 3, 2018.
- Department of Physics, Princeton University, USA, Nov 18 - Dec 8, 2017
- Chemical Physics Theory Group, Department of Chemistry, University of Toronto, CANADA, Oct 28 - Nov 12, 2017
- School of Physical Science and Technology, Soochow University, Suzhou, CHINA, December Sep 10-20, 2017
- TIFR Centre for Interdisciplinary Sciences, Hyderabad, INDIA, June 23, 2017.
- Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, May 16-21, 2017
- Department of Physics at City College of the City University of New York, New York, USA, March 20-24, 2017
- The Institute of Mathematical Sciences (IMSc), Chennai, INDIA, February 1 - February 3, 2017.
- School of Physical Science and Technology, Soochow University, Suzhou, CHINA, December 15-24, 2016
- Chemical Physics Theory Group, Department of Chemistry, University of Toronto, CANADA, April 22 - May 2, 2016
- Chemical Physics Theory Group, Department of Chemistry, University of Toronto, CANADA, February 4 - February 10, 2016
- Chemical Physics Theory Group, Department of Chemistry, University of Toronto, CANADA, December 9, 2015 - December 13, 2015.
- Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, INDIA, 27 July - 31 July, 2015
- The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bengaluru, INDIA, 19 June - 24 July, 2015

- The International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bengaluru, INDIA, 18 January - 23 January, 2015
- Chemical Physics Theory Group, Department of Chemistry, University of Toronto, CANADA, November 26 - December 2, 2014
- William I. Fine Theoretical Physics Institute of University of Minnesota, Minneapolis, USA, 22 September - 27 September, 2014
- University of Wisconsin, Madison, USA, September 25-26, 2013, USA
- Joint Quantum Institute, Maryland, USA, May 23, 2013, USA
- Brookhaven National Laboratory, USA, May 1-3, 2013, USA
- Pacific Institute of Theoretical Physics, University of British Columbia, July 17, 2012 to July 22, 2012, CANADA
- University of Virginia, July 2, 2011 to Aug 7, 2011, USA

### **Scientific journals refereed**

- Physical Review Letters, Physical Review B, Physical Review X, The European Physical Journal D, Scientific Reports, Nature Publishing Group, Europhysics Letters, Int. J. Mod. Phys. B, Invitations received to review manuscripts in Physical Review A, SciPost, J. Phys. A: Math. Theor. Invited to be a Guest Editor for Disorder Physics: from Condensed Matter to Photons and Ultracold Atoms, Frontiers in Physics

### **Selected Grants, Awards and Credentials**

- CEFIPRA conference grant (2024), Indian PI: Manas Kulkarni (ICTS). French PI: Gregory Schehr (LPTHE)
- Editorial Board of Journal of Statistical Mechanics
- Institute of Physics CNRS Guest Researcher (2024)
- International Research Project (IRP) by CNRS. Lead coordinators: Satya Majumdar (LPTMS), Gregory Schehr (LPTHE), Gautam Mandal (TIFR), Manas Kulkarni (ICTS).
- Indian National Science Academy (INSA) Medal for Young Scientists 2022
- Featured in 75 Under 50: Scientists Shaping Today's India, published by the Department of Science and Technology, Govt of India.
- VAJRA Grant with VAJRA Faculty Herbert Spohn (Technical University Munich) and co-PI Abhishek Dhar (ICTS-TIFR, Bangalore), Department of Science and Technology (DST), Govt. of India

- Rutgers Global International Collaborative Research Grant with Prof. Jedediah Pixley, Rutgers University, USA.
- Awarded the SERB MATRICS Grant by the Department of Science and Technology, Govt. of India (2020)
- Selected as Prajawani Young Achiever (leading Kannada daily) for 2020, in the field of science
- Awarded the SERB Early Career Research award (ECRA) by the Department of Science and Technology, Govt. of India (2019)
- Awarded the research grant by CEFIPRA, Indo-French Centre for the Promotion of Advanced Research (2019)
- Selected as an associate member of the Indian Academy of Sciences (2017-2020)
- Awarded the Ramanujan Fellowship, Department of Science and Technology, Govt. of India (2017)
- Professional Staff Congress - City University of New York (PSC-CUNY) Research Grant (2016), "Nonlinear dynamics in Non-local and Open Systems", Role: Principal Investigator.
- Recipient of the William Stewart Award (2016) by City University of New York, New York, USA.
- Professional Staff Congress - City University of New York (PSC-CUNY) Research Grant (2015), "Quantum state preparation and long-lived entanglement in hybrid quantum systems", Role: Principal Investigator.
- Invited in February 2015 to become an associated-faculty of the International Centre for Theoretical Sciences (ICTS) of the Tata Institute of Fundamental Research, Bengaluru, INDIA.
- Awarded the ICAM NSF grant (US National Science Foundation) for Advanced Workshop on Non-Equilibrium Bosons: from Driven Condensates to Non-Linear Optics", ICTP, Trieste, August 2013, ITALY
- Organizer of Focus-Group on Nonequilibrium Physics with light and matter, Princeton University, 2012-2014
- Awarded the Dr. Nathaniel and Fanie Soroff Prize for outstanding contributions in physics, May 2011, Stony Brook University, USA.
- Organizer of the Gotham-Metro Condensed Matter Meeting of The New York Academy of Sciences, New York City, April 2011, Nov 2010, April 2010 and Nov 2009.
- Peter Kahn Fellowship, May 2011, Department of Physics and Astronomy, State University of New York at Stony Brook, USA.

- Awarded grant from US National Science Foundation (NSF) as one of the 25 USA participants to “Beyond Moore’s Law2 (BML2) Winter school”, February, 2010, SOUTH KOREA
- Peter Kahn Fellowship, May 2008, Department of Physics and Astronomy, State University of New York at Stony Brook, USA.
- Recipient of the “National Science Fellowship” under “Kishore Vaigyanik Protsahan Yojana” (KVPY) given by the Indian Institute of Science, Bengaluru and funded by the Department of Science and Technology, Government of India.