Kunal Pal

Curriculum Vitae

Personal details

Post Doctoral researcher
Center for Theoretical Physics (CTP), Seoul National University

Birth:	June 19, 1996
Phone:	(+91) 7872759606
Email:	kunalpal@iitk.ac.in
	kunalpal992@gmail.com
	kunalpal171@gmail.com
Nationality:	Indian

Education

Post Doctoral researcher 2023-present
Center for Theoretical Physics (CTP), Seoul National University

Doctor of Philosophy (Ph.D.) 2018-2023
Indian Institute of Technology Kanpur, India
Thesis advisor: Tapobrata Sarkar

Masters degree in Physics (M.Sc.) 2016-2018
Indian Institute of Technology Kanpur, India.
M.Sc. degree awarded in June 2019 as a part of the M.Sc.-Ph.D. dual degree program.

Bachelor of Science (B.Sc.) in Physics (Honours) 2013-2016
Calcutta University, Kolkata, India.

Research interests

- Theoretical and observational aspects of ultra compact objects with or without horizons (black holes, wormholes, naked singularities, etc).
- Constructions of wormholes in a laboratory setup.
- Field theory in Analogue gravity set ups.
- Thermalization and information scrambling- the emergence of steady states in driven CFT.
- Information theoretical probes of scrambling and quantum chaos. Krylov complexity as a probe of quantum chaos.
- Quantum systems out-of-equilibrium- Correlation functions, OTOC, and entanglement measures.
- Dynamical quantum phase transitions and their topological nature.
- Information geometry in black holes and condensed matter Systems.
- Entanglement in gravitational systems as a probe of quantum gravitational phenomena. Entanglement harvesting and detection, particularly in curved spacetime.

List of publications [iNSPIRE-HEP]

1. ***Collapse in $f(R)$ gravity and the method of R matching***
Sandip Chowdhury, **Kunal Pal**, Kuntal Pal and Tapobrata Sarkar,
Eur.Phys.J.C 80 (2020) 9, 902
arxiv:1909.04411 [gr-qc]

2. ***The geometry of RN-AdS fluids***
Joy Das Bairagya, **Kunal Pal**, Kuntal Pal and Tapobrata Sarkar,
Phys.Lett.B 805 (2020), 135416
arxiv:1912.01183 [hep-th]

3. ***Geometry of AdS black hole thermodynamics in extended phase space***
Joy Das Bairagya, **Kunal Pal**, Kuntal Pal and Tapobrata Sarkar,
Phys.Lett.B 819 (2021), 136424
arxiv:2004.06498 [hep-th]

4. ***Quantum potential in bouncing dust collapse with a negative cosmological constant***
Sandip Chowdhury, **Kunal Pal**, Kuntal Pal and Tapobrata Sarkar,
Phys.Lett.B 816 (2021), 136269
arxiv2007.10971[gr-qc]

5. ***Disformal transformations and the motion of a particle in semi-classical gravity***
Sandip Chowdhury, **Kunal Pal**, Kuntal Pal and Tapobrata Sarkar,
Eur.Phys.J.C 81 (2021) 10, 946
arxiv:2101.05745 [gr-qc]

6. ***Constraining alternatives to the Kerr black hole***
Rajibul Shaikh, **Kunal Pal**, Kuntal Pal and Tapobrata Sarkar,
Mon.Not.Roy.Astron.Soc. 506 (2021) 1, 1229-1236
arxiv:2102.04299 [gr-qc]

7. ***Nielsen complexity of coherent spin state operators***
Kunal Pal, Kuntal Pal and Tapobrata Sarkar,
Phys. Rev. E 105, 064117
arxiv:2106.11842 [quant-ph]

8. ***Shadows in conformally related gravity theories***
Kunal Pal, Kuntal Pal, Rajibul Shaikh, and Tapobrata Sarkar,
Phys.Lett.B 829 (2022), 137109
arxiv:2110.13723 [gr-qc]

9. ***Analogue Metric in a black-bounce background***
Kunal Pal, Kuntal Pal and Tapobrata Sarkar,
Universe 8 (2022) 4, 197
arxiv:2204.06395 [gr-qc]

10. ***Complexity in the Lipkin-Meshkov-Glick model***
Kunal Pal, Kuntal Pal and Tapobrata Sarkar,
Phys. Rev. E 107, 044130
arxiv:2204.06354 [quant-ph]

11. ***Evolution of circuit complexity in a harmonic chain under multiple quenches***
Kuntal Pal, **Kunal Pal**, Ankit Gill and Tapobrata Sarkar,
J.Stat.Mech. 2305 (2023) 053108
arxiv:2206.03366 [quant-ph]

12. ***Regularising the JNW and JMN naked singularities***
Kunal Pal, Kuntal Pal, Pratim Roy and Tapobrata Sarkar,
Eur. Phys. J. C **83**, 397 (2023).
arxiv:2206.11764 [gr-qc]

13. ***Time evolution of spread complexity in quenched Lipkin-Meshkov-Glick model***
Mir Afrasiar, Jaydeep Kumar Basak, Bidyut Dey, **Kunal Pal**, Kuntal Pal
arxiv:2208.10520 [hep-th]

14. ***Conformal Fisher information metric with torsion***
Kunal Pal, Kuntal Pal and Tapobrata Sarkar,
J.Phys.A 56 (2023) 33, 335001
arxiv:2210.04759 [physics.class-ph]

15. ***Time evolution of spread complexity and statistics of work done in quantum quenches***
Kuntal Pal, **Kunal Pal**, Ankit Gill and Tapobrata Sarkar,
Phys. Rev. B **108**, 104311
arxiv:2304.09636 [quant-ph]

16. ***A rotating modified JNW spacetime as a Kerr black hole mimicker***
Kunal Pal, Kuntal Pal, Rajibul Shaikh and Tapobrata Sarkar,
arxiv:2305.07518 [gr-qc]

17. ***Geodesically completing regular black holes by the Simpson-Visser method***
Kunal Pal, Kuntal Pal and Tapobrata Sarkar,
Gen.Rel.Grav. 55 (2023) 10, 121
arXiv:2307.09382 [gr-qc]

18. ***Spread complexity evolution in quenched interacting quantum systems***
Mamta Gautam, **Kunal Pal**, Kuntal Pal, Ankit Gill, Nitesh Jaiswal and Tapobrata Sarkar,
arxiv:2308.00636 [quant-ph]

19. ***Time evolution of spread complexity and statistics of work done in quantum quenches***
Ankit Gill, Kuntal Pal, **Kunal Pal**, and Tapobrata Sarkar,
arxiv:2311.07892 [quant-ph]

Visits and Talks

- ***"Testing black hole mimickers in the EHT data"***, Talk presented during a visit at the Indian association for the cultivation of science (September 2023).
- ***"Evolution of spread complexity after a quantum quench"***, Talk presented during a visit at the Saha Institute of Nuclear Physics (December 2022).
- ***"Time evolution of spread complexity after a quantum quench"***, Talk presented at the Harish chandra research institute (February 2023).

Awards/Fellowships

- INSPIRE-Scholarship for Higher Education (INSPIRE-SHE), based on class 12 th standard examination results (top 1 percentage) of respective Boards (2013-2016).
- Qualified Joint Admission Test For Masters (JAM, 2016)(All India rank-237).
- Qualified Joint Entrance Screening Test (JEST, 2016, M.Sc. entrance test)(All India rank-32).
- Institute fellowship during M.Sc. programme from Indian Institute of Technology Kanpur (IIT Kanpur)(2016-2018).
- Institute Graduate Research Fellowship from Indian Institute of Technology Kanpur (IIT Kanpur) (2018-present).
- Mitacs Globalink Research Award to Canada (SICI) (2021).

Teaching assistantship

1. ***Physics***: PHY 102 (Classical mechanics), PHY 103 (Electrodynamics), PHY 226B (Special Relativity).
2. ***Physics Laboratory***: PHY 101 (UG laboratory), PHY 461 (PG laboratory).
3. ***Online Laboratory***: PHY 461.

Computer skills

Computational skills:

- Mathematica Programming

Softwares:

- Data analysis: Mathematica, Origin Plot
- Documentation: Latex, Libre Office, MS Office, Inkscape

Platforms: GNU Linux (Ubuntu), Windows