

SREE MAHESH CHANDRAN

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Links:
[INSPIRE-HEP Profile](#)
[Google Scholar Profile](#)
[ResearchGate Profile](#)

Research Areas

Quantum field theory in curved space-times; Quantum information theory; Analogue Gravity.

Academic History

Postdoctoral Researcher 2024 -
Seoul National University, South Korea

Ph.D. in Physics 2019-2024
Indian Institute of Technology (IIT) Bombay, Maharashtra, India

Thesis : Understanding curved geometry via quantum entanglement of matter fields
Supervisor: Prof. S. Shankaranarayanan

- 5 years of research experience working on topics at the interface of quantum field theory, quantum information theory and general relativity, with 6 peer-reviewed publications in reputed journals.

Research Assistant 2018-2019
IIT Bombay, Maharashtra, India

- 6 months of research experience working for the funded project titled “*Quantum universe: Linking fundamental physics and cosmology*”.

BS-MS Dual Degree in Physics 2013-2018
Indian Institute of Science Education and Research Thiruvananthapuram, India

- 1+ years of research experience working on the Masters thesis titled “*UV-IR Properties of Quantum Entanglement in Particles and Fields*”.

Funding and Achievements

Honorable Mention, 2024 Awards for Essays on Gravitation 2024
Gravity Research Foundation (GRF), United States of America

- Original work was recognized in the annual competition organized by GRF for thought-provoking and stimulating essays on the phenomenon of gravitation.

Prime Minister’s Research Fellowship 2021-2024
Ministry of Education, India

- Highly selective, rigorously reviewed premier Govt. fellowship that provides the highest stipend and largest research grant possible for PhD students in India.

INSPIRE Fellowship 2019-2021
Department of Science and Technology (DST), India

- Fellowship offered by DST for attracting meritorious students to pursue doctoral research in both basic and applied science areas.

Junior Research Fellowship/Lectureship qualification

2018

Joint CSIR-UGC-Net Exam, India

- All India Rank **140** in the country-wide test conducted to determine eligibility for Junior Research Fellowship (JRF) as well as Assistant Professorship (LS) admissions in Indian universities.

INSPIRE Scholarship

2013-2018

Department of Science and Technology (DST), India

- Scholarship offered by DST for attracting meritorious students to study basic and natural sciences at the college and university level.

Teaching Experience

Teaching Assistant

2019-2024

IIT Bombay, Maharashtra, India

- Prepared study materials and conducted tutorial sessions for undergraduate physics courses.
- Graded and proctored several exams.

Teaching Instructor

2022

AAA Aspirants Course for IIT-JAM

Jai Hind College, Mumbai, Maharashtra

- Conducted a course that covered UG-level physics and developed problem-solving skills for tackling IIT-JAM, a nation-wide eligibility test for postgraduate (Masters) admissions in Indian universities.

Leadership and Outreach

Local Organizing Committee Member

2024

Testing Gravity with Multimessenger Astronomy

IIT Bombay, Mumbai, Maharashtra

- Helped organize a workshop on the theoretical and observational frontiers of testing general relativity. Participants included leading researchers from CalTech, PennState, U. Minnesota, IUCAA, etc.

Course instructor

2023-2024

Introduction to Modern Physics

Hari Sri Vidya Nidhi School, Thrissur, Kerala

- Developed and taught a course aimed at familiarizing 11th/12th grade school students with key concepts and developments in physics from the past century

District-level Judge

2023

National Children's Science Congress (NCSC)

PM Shri Kendriya Vidyalaya, Powai, Mumbai, Maharashtra

- Contributed as a district-level judge for the NCSC — a competitive forum for school children to exhibit their creativity, innovativeness, and ability to solve local societal problems through scientific methods.

Conferences and Seminar Talks

- Invited to present a talk at the **17th Marcel Grossmann Meeting**, Italy (2024)
- Presented a talk at the **International Conference on Gravitation and Cosmology**, India (2023)
- Presented a talk at the **Quantum Gravity 2023** conference, Netherlands (2023)

- Invited to present a talk at the **University of Camerino**, Italy (2023)
- Attended the **ICCUB School 2023: Entanglement in QFT**, Spain (2023)
- Invited to present a talk at the **Laboratoire de Physique de l'École normale supérieure**, France (2023)
- Attended the **Cosmology & Quantum Physics at LPENS** workshop in Paris, France (2023)
- Presented a talk at the **Analogue Gravity in 2023** conference, Spain (2023)
- Invited to present a talk at the **Indian Institute of Technology Madras**, India (2023)
- Invited to present a talk at the **Abdus Salam International Center for Theoretical Physics**, Italy (2022)
- Invited to present a talk at the **University of Bologna**, Italy (2022)
- Invited to present a talk at the **Scuola Internazionale Superiore di Studi Avanzati (SISSA)**, Italy (2022)
- Presented a talk online in the **QFTCS Workshop** (2022)
- Attended the **First IAGRG School on Gravitation and Cosmology** (2022)
- Presented a talk online in the **16th Marcel Grossmann Meeting** (2021)
- Presented a talk online in the **IAGRG Meeting** (2020)

Software Skills

Programming Language/Tools: Java, Python, Matlab, Mathematica, Maple

Markup Language/Tools: Tex, Word, Jupyter Notebook

Publication List

7. A. Belfiglio, S. M. Chandran, O. Luongo, and S. Mancini, *Horizon entanglement area law from regular black hole thermodynamics*, under review at Phys. Rev. D, e-print: [arXiv:2407.03775](https://arxiv.org/abs/2407.03775) (2024)
6. S. M. Chandran and S. Shankaranarayanan, *Distinguishing bounce and inflation via quantum signatures from cosmic microwave background*, accepted for publication in *Int. J. Mod. Phys. D*, e-print: [arXiv:2405.08543](https://arxiv.org/abs/2405.08543) (2024) (**Honorable mention in the 2024 GRF Essay competition**)
5. S. M. Chandran, K. Rajeev and S. Shankaranarayanan, *Real-space quantum-to-classical transition of time dependent background fluctuations*, *Phys. Rev. D* **109** 023503, e-print: [arXiv:2307.13611](https://arxiv.org/abs/2307.13611) [gr-qc] (2024)
4. S. M. Chandran, and S. Shankaranarayanan, *Dynamical scaling symmetry and asymptotic quantum correlations for time-dependent scalar fields*, *Phys. Rev. D* **107** 025003, e-print: [arXiv:2205.133382](https://arxiv.org/abs/2205.133382) (2023)
3. P. Jain, S. M. Chandran, and S. Shankaranarayanan, *Log to log-log crossover of entanglement in (1+1)-dimensional massive scalar fields*, *Phys. Rev. D* **103** 125008, e-print: [arXiv:2103.01772](https://arxiv.org/abs/2103.01772) (2021)
2. S. M. Chandran, and S. Shankaranarayanan, *One-to-one correspondence between entanglement mechanics and black hole thermodynamics*, *Phys. Rev. D* **102** 125025, e-print: [arXiv:2010.03418](https://arxiv.org/abs/2010.03418) (2020)
1. S. M. Chandran, and S. Shankaranarayanan, *Divergence of entanglement entropy in quantum systems: Zero-modes*, *Phys. Rev. D* **99** 045010, e-print: [arXiv:1810.03888](https://arxiv.org/abs/1810.03888) (2019)

Conference Proceedings

1. S. M. Chandran, and S. Shankaranarayanan, *Black hole thermodynamics from entanglement mechanics*, *The Sixteenth Marcel Grossmann Meeting*, pp. 1223-1237 (2023)

References

1. **S. Shankaranarayanan** (PhD Supervisor)
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2. **Stefano Mancini** (Collaborator)
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3. **Orlando Luongo** (Collaborator)
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4. **Arul Lakshminarayan** (External Thesis Reviewer)
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