Subhodeep Sarkar

Postdoctoral Researcher in Theoretical and Computational Gravity
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CURRENT POSITION AND AFFILIATION

Postdoctoral Researcher

- Centre for Strings, Gravitation and Cosmology,
  Department of Physics,
  Indian Institute of Technology, Madras,
  Tamil Nadu, India.

RESEARCH INTERESTS

Black Holes in General Relativity and Beyond: Theory and Numerics

Black Hole Perturbation Theory, Quasinormal Modes of Black Holes, Internal Structure of Black Holes, Gravitational Lensing and Black Hole Shadow, Classical and Quantum Aspects of Black Holes, Black Holes in Modified Theories of Gravity, Numerical Relativity, Critical Phenomena in Gravitational Collapse, Hyperboloidal Methods in General Relativity.

EMPLOYMENT

Indian Institute of Technology, Madras, Tamil Nadu, India

- Position: Postdoctoral Researcher — Aug 2024 – Present
  Division: Centre for Strings, Gravitation and Cosmology
  Department: Physics
  Mentor: Prof. Dawood Kothawala
  Funding Agency: Centre for Industrial Consultancy and Sponsored Research, IIT-M
- Position: Project Scientist (equiv. Postdoctoral Fellow) — Apr 2024 – Aug 2024
  Division: Centre for Strings, Gravitation and Cosmology

Jamia Millia Islamia (Central University), New Delhi, India

- Position: Junior Research Fellow — Feb 2023 – Mar 2024
  Department: Centre for Theoretical Physics
  Grant No.: CRG/2020/004347
  Principal Investigator: Prof. Anjan Ananda Sen
  Funding Agency: Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India

Indian Institute of Information Technology, Allahabad, Uttar Pradesh, India

- Position: Senior Research Fellow — Jul 2021 – Apr 2022
  Department: Applied Sciences
- Position: Junior Research Fellow — Jul 2019 – Jul 2021
  Department: Applied Sciences
  Project: Near Horizon Structure of Black Holes
  Grant No.: ECR/2017/002124
  Principal Investigator: Dr. Srijit Bhattacharjee
  Funding Agency: Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India

EDUCATION

Indian Institute of Information Technology, Allahabad, Uttar Pradesh, India

Ph.D., Physics, November 2024

- Thesis Title: *A Descent into the Maelström: Probing the near-horizon structure of black holes using perturbative techniques*
- Supervisor: Dr. Srijit Bhattacharjee, IIIT, Allahabad

- CGPA/DGPI : *9.44*
- Completed Credits: 76 (Min. Credits: 64)
- Note: *Thesis Defense on 4 November 2024*.
- Degree awarded during the XX Convocation on 13 September 2025.

Jamia Millia Islamia (Central University), New Delhi, India

M.Sc., Physics, June 2018

- CGPA: 9.5 *(Placed in First Class with Distinction)*
- Project Supervisor: Prof. Anjan Ananda Sen
- Topic: The Generalized Proca Action in the Randall-Sundrum Braneworld Scenario
- Special Papers: General Theory of Relativity, Quantum Field Theory, Particle Physics, Classical Field Theory

Asutosh College, University of Calcutta, Kolkata, West Bengal, India

B.Sc.(Honours), Physics, June 2016

- Result: First Class with Honours (*Secured 63.625 %*)

National Gems Higher Secondary School, Kolkata, West Bengal, India

Indian School Certificate Examination - I.S.C. (Higher Secondary), May 2012

- Result: *Secured 96.00% (aggregate)*

Indian Certificate of Secondary Education - I.C.S.E. (Secondary), May 2010

- Result: *Secured 95.40% (aggregate)*

PUBLICATIONS AND PREPRINTS

Preprints

1. Vitor Cardoso, Shauvik Biswas and **Subhodeep Sarkar**, *The Physics of Black Holes and Their Environments: Consequences for Gravitational Wave Science*. 11, 2025, [2511.14841].

Published Papers

1. Sunil Singh Bohra, **Subhodeep Sarkar** and Anjan Ananda Sen, *Gravitational atoms in the braneworld scenario*, *Phys. Rev. D* **109** (2024) 104021 [2312.07295] {iNSPIRE}.
2. Subhodeep Sarkar, Mostafizur Rahman and Sumanta Chakraborty, *Perturbing the perturbed: Stability of quasinormal modes in presence of a positive cosmological constant*, *Phys. Rev. D* **108** (2023) 104002 [2304.06829] {iNSPIRE}.
3. **Subhodeep Sarkar**, Shailesh Kumar and Srijit Bhattacharjee, *Can we detect a supertranslated black hole?*, *Phys. Rev. D* **105** (2022) 084001 [2110.03547] {iNSPIRE}.
4. Srijit Bhattacharjee, **Subhodeep Sarkar** and Arpan Bhattacharyya, *Scalar perturbations of black holes in Jackiw-Teitelboim gravity*, *Phys. Rev. D* **103** (2021) 024008 [2011.08179] {iNSPIRE}.
5. Srijit Bhattacharjee, Shailesh Kumar and **Subhodeep Sarkar**, *Mass inflation and strong cosmic censorship in a nonextreme BTZ black hole*, *Phys. Rev. D* **102** (2020) 044030 [2005.09705] {iNSPIRE}.

PUBLICATION METRICS

iNSPIRE HEP

Papers: 6
Citations: 129
h-index: 5
Citations/paper (avg): 21.5

Google Scholar

Papers: 5
Citations: 133
h-index: 5
i10-index: 5

Semantic Scholar

Papers: 5
Citations: 75
h-index: 5
Highly Influential Citations: 4

Web of Science

Papers: 5
Citing Articles: 92
h-index: 5

SERVICE AND MEMBERSHIP

Peer Review

- *Reviewer* for General Relativity and Gravitation, European Physical Journal C.

Academic Bodies

- *Life Member*, **Indian Association for General Relativity and Gravitation (IAGRG)**.

TEACHING EXPERIENCE

Tutor, Workshop/School/Conference

- Beyond the Horizon, ICTS Bangalore — 24 March 2025 to 04 April 2025
  Workshop on Testing the Black Hole Paradigm
  Instructor: Vitor Cardoso

Teaching Assistant, Department of Physics, IIT Madras

Classical Physics — 2025 Odd Semester
Paper Code: PH5820
Program: B.Tech., M.Sc. and Ph.D.
Instructor: Prof. Dawood Kothawala

Computational Physics — 2025 Even Semester
Paper Code: PH5720
Program: B.Tech. (Dual Degree) and MSc (Physics)
Instructor: Dr. Samir Choudhuri

Teaching Assistant, Department of Applied Sciences, IIIT, Allahabad

Engineering Physics — 2022 Odd Semester, 2021 Odd Semester, 2020 Odd Semester, 2019 Odd Semester
Paper Code: SEGP132C
Program: B.Tech. in IT and ECE
Instructor: Dr. Srijit Bhattacharjee

Biological Data Analytics (Biostatistics) — 2021 Odd Semester, 2020 Odd Semester
Paper Code: SBDA131C
Program: M.Tech. in Bioinformatics
Instructor: Dr. Srijit Bhattacharjee

Computational Methods in Physics using Python (CoMP-Py) — 2021 Summer Break
Program: Short Term Certificate Course
Instructor: Dr. Srijit Bhattacharjee

Numerical Methods for Bioinformatics — 2022 Even Semester, 2021 Even Semester
Program: M.Tech. in Bioinformatics
Instructor: Dr. Srijit Bhattacharjee

Nonlinear Dynamics and Infectious Disease Modeling — 2022 Odd Semester
Program: M.Tech. in Bioinformatics
Instructor: Dr. Srijit Bhattacharjee

MENTORING

Assisted *Prof. Anjan Ananda Sen* in supervising the following students at **CTP, Jamia Millia Islamia**

- Nargis Rashid (Jamia Millia Islamia), M.Sc. Thesis on *Black Holes and Quasinormal Modes in Modified Gravity*, 2023.

Assisted *Dr. Srijit Bhattacharjee* in supervising the following students at **IIIT, Allahabad**

- Kayyum Yusufali Sayyad (IIIT, Allahabad), M.Tech. Thesis on *Infectious Disease Modeling*, 2023
- Sanchari Biswas and Yuvasri G (Christ University, Bangalore), M.Sc. Thesis on *Black Hole Shadow*, 2022.
- Ashley Chraya (IISER Mohali), Summer Project on *Quasinormal Modes of Black Holes*, 2021.

OTHER ACADEMIC ACHIEVEMENTS

National Examinations

- Qualified GATE 2019 (Rank: 993, Score: 462).
- Qualified IIT JAM 2016 (Rank: 863).
- Ranked in the top 1% nationwide in the Indian School Certificate Examination 2012.

Awards and Scholarships

- Junior Research Fellowship (DST-SERB) at Jamia Millia Islamia in 2023.
- Senior Research Fellowship (DST-SERB) at IIIT, Allahabad in 2021.
- Junior Research Fellowship (DST-SERB) at IIIT, Allahabad in 2019.
- Merit Based Scholarship for Performance in 1st Year M.Sc. Examination at Jamia Millia Islamia in 2017.

SKILLS

Languages:

- English (C1), Bengali (Native), Hindi (Bilingual).

Programming:

- *Experienced in* Julia, Wolfram Language (Mathematica), and Python (Scientific Stack).
- *Familiar with* C/C++, FORTRAN, SageMath, Maple, Cadabra.

Document Creation:

- LaTeX, Markdown.

TALKS AND POSTER PRESENTATIONS

Talks

- *Black hole quasinormal mode instability: Insights from the pseudospectrum* — 05 Mar 2025
  Physics Seminar
  Chennai Mathematical Institute
- *Black hole quasinormal mode instability: Insights from the pseudospectrum* — 25 Feb 2025
  Theoretical Physics Seminar
  Saha Institute of Nuclear Physics, Kolkata
- *Black hole quasinormal mode instability: Insights from the pseudospectrum* — 05 Nov 2024
  Strings Group Seminar
  Harish-Chandra Research Institute, Prayagraj (Allahabad)
- *The pseudospectrum of asymptotically de Sitter black holes.* — 01 Jul 2024
  Virtual Infinity Workshop 2024
  Hyperboloidal Research Network
- *Black hole quasinormal mode instability: Insights from the pseudospectrum* — 18 Jan 2024
  CTP Seminar, Centre for Theoretical Physics
  Jamia Millia Islamia, New Delhi
- *Perturbing the perturbed: The spectra and pseudospectra of asymptotically de Sitter black holes* — 14 Dec 2023
  Departmental Seminar, School of Physical Sciences
  Indian Association for the Cultivation of Science, Kolkata
- *Perturbing the perturbed: Quasinormal mode instability in asymptotically de Sitter black holes* — 09 Dec 2023
  Parallel Session on Classical and Quantum Gravity
  10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023)
  IIT Guwahati

- *Testing the Strong Cosmic Censorship Conjecture in Anti-de Sitter spacetimes* 28 Jul 2022
  Departmental Seminar, School of Physical Sciences
  Indian Association for the Cultivation of Science, Kolkata
- *The Strong Cosmic Censorship Conjecture in Anti-de Sitter Spacetimes* 18 May 2022
  Atlantic General Relativity 2022
  Memorial University of Newfoundland and Labrador, Canada
- *Testing the Strong Cosmic Censorship Conjecture in Anti-de Sitter spacetimes* [Watch on YouTube] 11 Mar 2022
  Testing Aspects of General Relativity
  IIT Gandhinagar, IIIT Allahabad, University of Lethbridge, Canada
- *Inner-horizon Instability in BTZ Black Holes* 14 Apr 2021
  21st British Gravity Meeting (BritGrav21)
  University College Dublin, Ireland
- *Inner-horizon Instability in BTZ Black Holes* 05 Oct 2020
  Workshop on Mathematical and Computational Approaches for Solving the Source-Free Einstein Field Equations
  ICERM, Brown University, USA

Poster Presentations

- *Exploring Quasinormal Modes and Strong Cosmic Censorship in 2D Black Hole Models* 6 Dec 2023
  10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023)
  IIT, Guwahati on behalf of **IAGRG**
- *Inner-horizon Instability in BTZ Black Holes* 19 Dec 2020
  31st Meeting of the Indian Association for General Relativity and Gravitation (IAGRG)
  IIT, Gandhinagar on behalf of **IAGRG**

WORKSHOPS, CONFERENCES AND OTHER ACADEMIC ACTIVITIES

Assisted in organizing

- The Second **School on Black Holes and Gravitational Waves**, IIT, Madras, 10 – 14 Feb 2025.
- Online Workshop on **Numerical and Analytical Relativity (NAR) 2024**, IIIT, Allahabad, 20 – 22 March 2024.
- Short Term Certificate Course on **Computational Methods in Physics using Python (CoMP-Py) 2021**, IIIT, Allahabad, 01 May – 10 July 2021.
- Vritika Seminars on **Computational and Theoretical Aspects of Gravitational Physics (CompGravIIITA)**, IIIT, Allahabad, June – July 2021.
- **Applications of Data Science in Astrophysics and Gravitational Wave Research (DSAP) 2019**, IIIT, Allahabad, 01 – 03 November 2019.
- **XXXIV Annual Indian Association of Physics Teachers (IAPT) Convention 2019**, IIIT, Allahabad, 13 – 15 October 2019.
- **National Seminar on Recent Advances & Innovations in Physics Teaching and Research (RAIPTR) 2019**, IIIT, Allahabad, 13 – 15 October 2019.

Attended

- **The Future of Gravitational-Wave Astronomy** organized by ICTS, Bangalore, 27 – 31 October 2025.
- **Beyond the Horizon: Testing the Black Hole Paradigm** organized by ICTS, Bangalore, 24 March – 04 April 2025.
- **Summer School on Gravitational-Wave Astronomy 2024** organized by ICTS, Bangalore, 01 – 12 July 2024.
- **Predictability in General Relativity** organized by RRI, ICTS and IAGRG, 28 – 29 February 2024.

- **10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023)** organized by IAGRG and IIT Guwahati, 05 – 09 December 2023.
- **IAGRG School on Gravitation and Cosmology** organized by IAGRG and ICTS, Bangalore, 09 – 23 October 2023.
- **Testing Aspects of General Relativity II** hosted by IIT Gandhinagar, IIIT Allahabad, University of Lethbridge, Canada, 11 – 13 April 2023.
- **Numerical Relativity Community Summer School** organized by the Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, USA, 08 – 12 August 2022.
- **First IAGRG School on Gravitation and Cosmology** organized by the Indian Association of General Relativity and Gravitation (IAGRG), 16 – 28 May 2022.
- **Atlantic General Relativity 2022** hosted by the Memorial University of Newfoundland and Labrador, Canada, 16 – 19 May 2022.
- **Testing Aspects of General Relativity** hosted by IIT Gandhinagar, IIIT Allahabad, University of Lethbridge, Canada, 11 – 14 March 2022.
- **Black Hole Inside Out 2021** organized jointly by Florida Space Institute, Tokyo Institute of Technology, and Yukawa Institute of Theoretical Physics (YITP), Kyoto University, 27 September – 1 October 2021.
- **2021 North American Einstein Toolkit School** organized by the National Center for Supercomputing Applications at the University of Illinois Champaign-Urbana, USA, 26 – 30 July 2021.
- **21st British Gravity Meeting (BritGrav21)** hosted by the Relativity Group in the School of Mathematics and Statistics at University College Dublin, 12 – 16 April 2021.
- **31st Meeting of the Indian Association for General Relativity and Gravitation (IAGRG)** organized by IIT, Gandhinagar on behalf of IAGRG, 19 – 20 December 2020.
- **Virtual Workshop on Statistical Methods for the Detection, Classification, and Inference of Relativistic Objects** organized by ICERM, Brown University, USA, 16 – 20 November 2020.
- **Virtual Workshop on Mathematical and Computational Approaches for the Einstein Field Equations with Matter Fields** organized by ICERM, Brown University, USA, 26 – 30 October 2020.
- **Virtual Workshop on Workshop on Mathematical and Computational Approaches for Solving the Source-Free Einstein Field Equations** organized by ICERM, Brown University, USA, 05 – 09 October 2020.
- **Online Workshop on Testing GR using Gravitational Waves** organized by IIT, Gandhinagar and IACS, Kolkata, 13 – 14 August 2020.
- **Student Talks on Trending Topics in Theory (ST4) 2020**, 04 – 14 July 2020.

ACADEMIC VISITS

National Visits

- Indian Institute of Technology Gandhinagar, Gujarat

  Host: Dr. Sudipta Sarkar
  Period: 24 Apr 2025 to 09 May 2025
  Period: 18 Nov 2024 to 22 Nov 2024

- Indian Institute of Information Technology Allahabad

  Host: Dr. Srijit Bhattacharjee
  Period: 02 Nov 2024 to 07 Nov 2024

- Indian Association for the Cultivation of Science, Kolkata

  Host: Dr. Sumanta Chakraborty
  Period: 15 Sep 2025 to 19 Sep 2025
  Period: 14 Feb 2025 to 26 Feb 2025
  Period: 10 Dec 2023 to 15 Dec 2023
  Period: 11 Jul 2022 to 05 Aug 2022

PROJECTS AND INTERNSHIPS

Project Student Dec 2018 to Mar 2019

Saha Institute of Nuclear Physics
Supervisor: Prof. Koushik Dutta
Topic: Vector Dark Matter Production at the End of Inflation

M.Sc. Project Student Jul 2017 to May 2018
Centre for Theoretical Physics,
Jamia Millia Islamia
Supervisor: Prof. Anjan Ananda Sen
Topic: Gravitation (Basics of General Relativity, Modified Theories of Gravity, Generalized Proca Theories, Warped Geometry and the Randall-Sundrum Model)

Summer Student May 2017 to Jul 2017
Department of Theoretical Physics,
Indian Association for the Cultivation of Science
Supervisor: Prof. Dilip Kr. Ghosh
Topic: A Reading Course on Quantum Field Theory

Visiting Student Dec 2016 to Jan 2017
Quantum Information and Computation Group,
Harish-Chandra Research Institute
Supervisor: Prof. Ujjwal Sen
Topic: A Reading Course on Quantum Entanglement and Quantum Information Theory

REFERENCES

Prof. Anjan Ananda Sen
Professor of Physics,
Centre for Theoretical Physics, E-mail: aasen@jmi.ac.in
Jamia Millia Islamia

Prof. Srijit Bhattacharjee
Associate Professor of Physics,
Department of Applied Sciences, E-mail: srijitb@iiita.ac.in
IIIT, Allahabad.

Prof. Dawood Kothawala
Professor of Physics,
Centre for Strings, Gravitation and Cosmology,
Department of Physics, E-mail: dawood@iitm.ac.in
IIT, Madras.

Prof. Sumanta Chakraborty
Assistant Professor of Physics,
School of Physical Sciences, E-mail: tpsc@iacs.res.in
IACS, Kolkata.

Prof. Lekha Nair
Former Head and Professor of Physics,
Department of Physics, E-mail: lnair@jmi.ac.in
Jamia Millia Islamia.

Prof. Somasri Sen
Associate Professor of Physics,
Department of Physics, E-mail: ssen@jmi.ac.in
Jamia Millia Islamia.

Prof. Tabish Qureshi
Former Hony. Director and Professor of Physics,
Centre for Theoretical Physics, E-mail: tabish@ctp-jamia.res.in
Jamia Millia Islamia.

CONTACT INFORMATION

Centre for Strings, Gravitation and Cosmology
Department of Physics,
Indian Institute of Technology, Madras
Chennai, Tamil Nadu 600036.
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Primary Email ID: subhodeep.sarkar1@gmail.com
Other Email IDs: subhodeep.sarkar@physics.iitm.ac.in, subhodeep@ctp-jamia.res.in

OTHER INFORMATION

Date of Birth: 17 July 1993
Nationality: Indian
Religion: None
Date of C.V.: 19 November 2025