# Subhodeep Sarkar

Postdoctoral Researcher in Theoretical Physics
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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

**Gravitation and Black Hole Physics**

Black Hole Perturbation Theory, Quasinormal Modes of Black Holes, Internal Structure of Black Holes, Classical and Quantum Aspects of Black Holes, Black Holes in Modified Theories of Gravity, Numerical 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

**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}.

**Manuscripts Under Preparation**

- *The Physics of Black Holes and their Environments: Consequences for Gravitational Wave Science* by Vitor Cardoso, **Subhodeep Sarkar** and Shauvik Biswas (to appear by November 2025).

## PUBLICATION METRICS

**iNSPIRE HEP**

Papers: 5
Citations: 122
h-index: 5
Citations/paper (avg): 24.4

**Google Scholar**

Papers: 5
Citations: 127
h-index: 5
i10-index: 5

**Semantic Scholar**

Papers: 5
Citations: 71
h-index: 5
Highly Influential Citations: 4

**Web of Science**

Papers: 5
Citing Articles: 90
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**

- **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

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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.: 13 Oct 2025