

Mr. Amit Samaddar

Ph.D. in Mathematics (Joined February 2022)

Department of Mathematics, National Institute of Technology Manipur, Imphal, 795004

Seeking a Postdoctoral Position

Date of Birth: 08 November 1998 | Nationality: Indian



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Research Focus and Interests

- My research lies at the interface of theoretical and observational cosmology, with a strong emphasis on exploring the dynamics of the Universe through alternative theories of gravity. I have extensively studied dynamical system analysis in various modified gravity frameworks, investigating the stability and evolution of cosmological solutions. A major part of my work focuses on developing and analyzing model-independent observational constraints, where I employ MCMC techniques and recent observational datasets to test the viability of modified gravity theories in explaining cosmic acceleration. Beyond background cosmology, my interests span several fundamental topics, including baryogenesis, bouncing cosmology, rip cosmology, and wormhole geometries, where I explore the theoretical consistency and physical implications of these scenarios. I am equally motivated to bridge theory and observation, and my current work aims at strengthening this connection.

Future Research Plans

- In the future, I intend to advance my expertise in observational cosmology by learning and applying emerging datasets and statistical tools. I am particularly interested in contributing to research involving black hole physics, stellar dynamics, 21 cm cosmology, and other key observational probes that can illuminate the nature of gravity and the evolution of the Universe. My long-term goal is to develop comprehensive frameworks that unify theoretical predictions with high-precision observational data.
- To date, I have published 39 peer-reviewed research articles, including 21 in Q₁ journals, all of which are listed in the Research Publications section of this CV.

Research Experience and Qualifications

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| Feb 2024 – Present |  Senior Research Fellow (SRF) , Department of Mathematics, <i>National Institute of Technology Manipur, Imphal, India.</i> |
| Feb 2022 – Feb 2024 |  Junior Research Fellow (JRF) , Department of Mathematics, <i>National Institute of Technology Manipur, Imphal, India.</i> |

Education

- Feb 2022 – Present  **Ph.D. in Mathematics**, National Institute of Technology Manipur, Manipur, India
PhD Topic: **Theoretical and observational cosmology in modified gravity and dynamical systems**
Specialization: **Theoretical and Observational Cosmology**
Supervisor: *Dr. S. Surendra Singh*
Thesis Title: *[Cosmological Evolution and Observational Constraints in Teleparallel and Non-Metricity Gravity]*
- June 2019 – May 2021  **M.Sc. in Mathematics**, National Institute of Technology Jamshedpur, Jharkhand, India
Specialization: **Applied Mathematics**
Master's Project: *Operations Research*
CGPA: 8.48
- 2016 – 2019  **B.Sc. (Honours) in Mathematics**, Durgapur Government College, Kazi Nazrul University, West Bengal, India
CGPA: 7.70

Teaching Experience

- 2022 – Present  **Teaching Assistant / Instructor**, Department of Mathematics, National Institute of Technology Manipur. Taught B.Tech and M.Tech courses: Laplace & Fourier Transformations, Numerical Analysis, Advanced Engineering Mathematics. Assisted in teaching M.Sc. Mathematics/Physics students. Experience in problem-solving sessions, assignments, and student mentoring.

Mentoring Experience

- 2022–Present  **M.Sc. Project Mentorship**, Department of Mathematics, NIT Manipur. Supervised M.Sc. students on projects related to cosmology and modified gravity, including: Keshav Singh (Roll No. 21308002), Vikas (Roll No. 21308003), Maripi Rajesh Kumar (Roll No. 21308008), Upasana Sarkar (Roll No. 22308005), Ayana Maiti (Roll No. 22308010), Bharat Singh (Roll No. 22308013), Ngangom Nongdamba Meitei (Roll No. 22308006), Shaibal Mani (Roll No. 23308004), Bidesha Rani Dey (24308009), Sophiya Ningthoujam (Roll No. 202300018081), DM University (Inspire project).

Research Publications

- 2026  Elangbam Chingkhenganba Meetei, **A. Samaddar**, S. S. Singh, “Observational constraints on fractional holographic dark energy in $f(T)$ gravity”, *Journal of High Energy Astrophysics*, 54(100686), (2026). DOI: 10.1016/j.jheap.2026.100686
-  **A. Samaddar**, S. S. Singh, “Reconstructing the expansion history of the Universe in Galileon gravity”, *Annalen der Physik*, 538(5), e70221 (2026). <https://doi.org/10.1002/andp.70221>

Research Publications (continued)

- **A. Samaddar**, S. S. Singh, "Observational signatures of scalar field dynamics in modified $f(Q, L_m)$ gravity", *Astrophysics and Space Science*, 371, 52 (2026). <https://doi.org/10.1007/s10509-026-04580-6>
- **A. Samaddar**, S. S. Singh, "Comparative Study of Cosmological Bounce Mechanisms within $f(Q, B)$ Gravity", *International Journal of Theoretical Physics*, 65, 66 (2026). <https://doi.org/10.1007/s10773-026-06286-5>
- **A. Samaddar**, S. S. Singh, "A study of Casimir wormhole in $f(R, L_m, T)$ gravity framework", *High Energy Density Physics*, 58, 101268 (2026). <https://doi.org/10.1016/j.hedp.2026.101268>
- **A. Samaddar**, S. S. Singh, "Late-time cosmic dynamics in $f(R, L_m)$ gravity with recent observations", *Journal of High Energy Astrophysics*, 51, 100558 (2026). <https://doi.org/10.1016/j.jheap.2026.100558>
- **A. Samaddar**, S. S. Singh, "Universe's accelerated expansion in $f(T, B)$ gravity: An observational perspective", *Modern Physics Letters A*, Vol. 41, Nos. 4 & 5 (2026) 2650001 (34 pages). DOI: 10.1142/So21773232650001X
- Shaibal Mani, S. Surendra Singh, **A. Samaddar**, "Phase space analysis of scalar field evolution in $f(Q)$ gravity", *Indian Journal of Physics*, (2026). <https://doi.org/10.1007/s12648-025-03914-4>
- 2025 ■ **A. Samaddar**, S. S. Singh, "A new parametric study of $f(Q, B)$ gravity with modified Chaplygin gas and recent observations", *European Physical Journal C*, 85, 1357 (2025). <https://doi.org/10.1140/epjc/s10052-025-15086-w>
- **A. Samaddar**, S. S. Singh, "Observational Analysis of Exponentially Decaying Viscous Cosmology in $f(Q, C)$ Gravity", *Fortschritte der Physik*, e70054. <https://doi.org/10.1002/prop.70054>
- **A. Samaddar**, S. S. Singh, "CPL-parametrized cosmic expansion in Galileon gravity: Constraints from recent data", *Physics of the Dark Universe*, 50, 102162 (2025). <https://doi.org/10.1016/j.dark.2025.102162>
- **A. Samaddar**, S. S. Singh, "Observational Constraints on $f(Q, C)$ Gravity with Extended Bose Einstein Condensate Dark Matter", *International Journal of Theoretical Physics*, 64, 299 (2025). <https://doi.org/10.1007/s10773-025-06179-z>
- **A. Samaddar**, S. S. Singh, "Cosmological insights from an exponential $Om(z)$ function in $f(T, T_G)$ gravity framework", *Journal of High Energy Astrophysics*, 50, 100495 (2025). <https://doi.org/10.1016/j.jheap.2025.100495>
- **A. Samaddar**, S. S. Singh, "A parametric reconstruction of cosmic acceleration in $f(T, B)$ gravity with a new Hubble ansatz", *International Journal of Modern Physics A*, Online ready (2025). <https://doi.org/10.1142/So217751X25501702>
- **A. Samaddar**, S. S. Singh, "Reconstructing cosmic expansion in $f(R, G)$ gravity using a log-periodic deceleration model", *Physics of the Dark Universe*, 50, 102081 (2025). <https://doi.org/10.1016/j.dark.2025.102081>

Research Publications (continued)

- **A. Samaddar**, S. S. Singh, "Observational viability of generalized Chaplygin gas in $f(Q, L_m)$ gravity", *Astrophysics and Space Science*, 370, 92 (2025). <https://doi.org/10.1007/s10509-025-04483-y>
- **A. Samaddar**, S. S. Singh, "Exploring the Dynamics of Dark Energy in $f(Q, C)$ Gravity: A Comprehensive Analysis Using Cosmological Datasets", *Astronomy Letters*, 51, 49–64 (2025). <https://doi.org/10.1134/S1063773725700203>
- **A. Samaddar**, S. S. Singh, "Barrow Holographic Dark Energy in $f(Q, L_m)$ gravity: A dynamical system perspective", *International Journal of Geometric Methods in Modern Physics*, 23 (12), 2550300, (2025). <https://doi.org/10.1142/S0219887825503001>
- **A. Samaddar**, S. S. Singh, "Observational and stability analysis of viscosity-driven cosmic acceleration in $f(Q, C)$ gravity", *High Energy Density Physics*, 56, 101216 (2025). <https://doi.org/10.1016/j.hedp.2025.101216>
- **A. Samaddar**, S. S. Singh, "Constraining Hořava–Lifshitz gravity with late-time cosmology", *Physics of the Dark Universe*, 49, 102030 (2025). <https://doi.org/10.1016/j.dark.2025.102030>
- **A. Samaddar**, S. S. Singh, "Constraining dark energy evolution in $f(Q, C)$ gravity using observational datasets and geometric diagnostics", *Journal of High Energy Astrophysics*, 48, 100404 (2025). <https://doi.org/10.1016/j.jheap.2025.100404>
- **A. Samaddar**, S. S. Singh, "Cosmological Dynamics and Stability Analysis in $f(T, B)$ Gravity with Interacting Scalar Field", *Foundations of Physics*, 55, 41 (2025). <https://doi.org/10.1007/s10701-025-00856-z>
- **A. Samaddar**, S. S. Singh, "Matter bounce cosmological model in $f(Q, C)$ gravity theory", *Modern Physics Letters A*, Vol. 40, No. 21n22, 2550071 (2025). <https://doi.org/10.1142/S0217732325500713>
- **A. Samaddar**, S. S. Singh, S. Kiranmala Chanu, "Dynamical systems of scalar fields in $f(Q, C)$ gravity", *Physics Letters A*, 549, 130575 (2025). <https://doi.org/10.1016/j.physleta.2025.130575>
- **A. Samaddar**, S. S. Singh, "A novel approach to baryogenesis in $f(Q, L_m)$ gravity and its cosmological implications", *Nuclear Physics B*, 1012, 116834 (2025). <https://doi.org/10.1016/j.nuclphysb.2025.116834>
- **A. Samaddar**, S. S. Singh, "Cosmological dynamics and thermodynamic behavior in $f(Q, C)$ gravity: An analytical and observational approach", *Physics of the Dark Universe*, 47, 101792 (2025). <https://doi.org/10.1016/j.dark.2024.101792>
- U. Sarkar, S. S. Singh, **A. Samaddar**, "Stability analysis of cosmological model in $f(T)$ gravity", *Modern Physics Letters A*, Vol. 40, No. 02, 2450206 (2025). <https://doi.org/10.1142/S0217732324502067>
- 2024 ■ **A. Samaddar**, S. S. Singh, "Phase space analysis of interacting and non-interacting models in $f(Q, C)$ gravity", *Chinese Physics C*, 49:015103 (2024). DOI: 10.1088/1674-1137/ad7f3f

Research Publications (continued)

- **A. Samaddar**, S. S. Singh, Md Khurshid Alam, "Dynamical System Analysis of Scalar Field Cosmology in $f(Q, T)$ Gravity with $q(z)$ Parametrization", *Gravitation and Cosmology*, 30, 462–480 (2024). <https://doi.org/10.1134/S0202289324700361>
- **A. Samaddar**, S. S. Singh, Shah Muhammad, Euaggelos E Zotos, "Dynamical system approach of interacting dark energy models in $f(R, T^\phi)$ gravity", *Communications in Theoretical Physics*, 77 045403 (2024). DOI 10.1088/1572-9494/ad91b2
- **A. Samaddar**, S. S. Singh, Shah Muhammad, Euaggelos E Zotos, "Holographic dark energy models and their behaviors within the framework of $f(Q, C)$ gravity theory", *Journal of High Energy Astrophysics*, 44, 1-18 (2024). <https://doi.org/10.1016/j.jheap.2024.09.001>
- **A. Samaddar**, S. S. Singh, Shah Muhammad, Euaggelos E Zotos, "Behaviours of rip cosmological models in $f(Q, C)$ gravity", *Nuclear Physics B*, 1006, 116643 (2024). <https://doi.org/10.1016/j.nuclphysb.2024.116643>
- **A. Samaddar**, S. S. Singh, Shah Muhammad, Euaggelos E Zotos, "Gravitational Baryogenesis in $f(Q, C)$ gravity", *International Journal of Geometric Methods in Modern Physics*, Vol. 21, No. 13, 2450231 (2024). <https://doi.org/10.1142/S0219887824502311>
- **A. Samaddar**, S. S. Singh, "Dynamical System Approach and Thermodynamical Perspective of Hořava-Lifshitz Gravity", *Fortschritte der Physik*, 72(6), 2400006 (2024). <https://doi.org/10.1002/prop.202400006>
- **A. Samaddar**, S. S. Singh, "Dynamical system method of viscous fluid in $f(T)$ gravity theory", *Physica Scripta*, 99 035219 (2024). DOI 10.1088/1402-4896/ad232a
- 2023 ■ **A. Samaddar**, S. S. Singh, "Qualitative stability analysis of cosmological models in $f(T, \phi)$ gravity", *General Relativity and Gravitation*, 55, 111 (2023). <https://doi.org/10.1007/s10714-023-03163-y>
- **A. Samaddar**, S. S. Singh, Md Khurshid Alam, "Dynamical system approach of interacting dark energy models with minimally coupled scalar field", *International Journal of Modern Physics D*, Vol. 32, No. 09, 2350062 (2023). <https://doi.org/10.1142/S0218271823500621>
- **A. Samaddar**, S. S. Singh, "Qualitative stability analysis of cosmological parameters in $f(T, B)$ gravity", *The European Physical Journal C*, 83, 283 (2023). <https://doi.org/10.1140/epjc/s10052-023-11458-2>

Professional Memberships

- Member, Manipur Mathematical Society.
- Member, International Association of Engineers (IAENG).
- Member, Indian Association for General Relativity and Gravitation (IAGRG).
- All India Council For Technical Skill Development.

Academic Service

Reviewer  The European Physical Journal C, Physics of the Dark Universe, Journal of Modern Physics, Nuclear Physics B, Indian Journal of Physics, Modern Physics Letters A, Astrophysics and Space Science, Gravitation and Cosmology, Annals of Physics, Turkish Journal of Physics, Physics Letters A, Annalen der Physik.

Awards and Achievements

2024  Participated in the National Level Statistics 18th Annual Awareness E-Quiz on “National Statistics Day (29 June 2024)” organized by the Department of Mathematics & Statistics on 29 June 2024.

2023  Participated in the “E-Quiz on National Statistics Day -2023” organized by Department of Mathematics and Statistics on 29/06/2023.

2021  Gate Exam in mathematics

2019  JAM Exam in mathematics

2016  WBJEE

Skills

Languages  Bengali, Hindi, English.

Programming  $\text{\LaTeX}$, Python, Mathematica, Git/GitHub, Microsoft Word.

Computational Tools  MCMC analysis, Bayesian inference, numerical ODE solvers, statistical modeling.

Cosmology Skills  Dynamical system analysis, modified gravity modelling ($f(Q)$, $f(Q, B)$, $f(Q, C)$, $f(Q, L_m)$, etc.), scalar field cosmology, data analysis of cosmological datasets (SN Ia, BAO, CMB, cosmic chronometers, etc.), parameter estimation.

Scientific Skills  Research writing, scientific presentation, peer-reviewing, collaborative research experience.

Conferences and Workshops Attended

-  Participated in the 5-day International Workshop on Algebra and Fluid Dynamics (IWAFFD-2025), held during October 21–25, 2025, organized by the Department of Mathematics, National Institute of Technology Jamshedpur.
-  Presented a paper titled “Dynamical system method of viscous fluid in $f(T)$ gravity theory” at the National Conference on Mathematics and Applications in Science, Technology and Society-2025, held during October 23–24, 2025, organized by the Department of Mathematics, Assam Don Bosco University, India.
-  Participated & presented a paper, entitled “Cosmological observations in $f(Q, C)$ gravity” at the “International Conference on Gravitation, Cosmology, Astrophysics, and Space Sciences (ICGCAS-2025)” held during October 17-19, 2025 organized by Pacific Institute of Cosmology and Selfology (PICS), Sagara, Sambalpur, Odisha, INDIA.

Conferences and Workshops Attended (continued)

- Participated & presented a paper title “Cosmological dynamics in $f(Q, C)$ gravity: An analytical and observational approach” in the International Conference on Astroparticle Physics, Gravitation and Cosmology (APGC-2025) from June 26-28, 2025 with joint collaboration of the GLA University, Mathura, India, Department of Physics, K.L.S. College, Nawada, India, School of Physics, Damghan University, Damghan, Iran & ARSD College, New Delhi, India.
- Participated in the 2-day hybrid workshop on Mathematical Methods and Simulations in Physical Sciences MMSPS-2025, held at SR University during 16-17 April 2025.
- Participated & presented a paper title “Holographic dark energy models and their behaviors within the framework of $f(Q, C)$ gravity theory”, in the International Conference on Mathematics and Applications-2025 (ICMA-2025) from March 06-07, 2025 organized by Department of Mathematics, The University of Burdwan, Golapbag, Burdwan-713104, West Bengal, India.
- Participated in the National conference on data Science Innovations in Astronomy (NCDSIA), organized by Department of Statistics Amity Institute of Applied Sciences, Amity University Kolkata and IUCAA Center for Astronomy Research & Development (ICARD), Kolkata from 3rd January to 4th January 2025.
- Participated & presented a paper title “Dynamical System Approach and Thermodynamical Perspective of Hořava-Lifshitz Gravity” in the International Conference on Advances in Mathematics and its Applications 2024 (ICAMA 2024) organized by the Department of Mathematics, Manipur university, Canchipur, Imphal, Manipur, India during December 06-07, 2024.
- Participated in the One Week Faculty Development Program on Scientific Software, organized by the Department of Mathematics, School of Basic Sciences, The Assam Kaziranga University, Jorhat, Assam, India from 12-18 July, 2024.
- Participated in the online workshop on “Recent Developments in Algebra” held at IIIT Allahabad, India during July 8 - 10, 2024.
- Presented the paper titled “Dynamical system analysis of viscous fluid in $f(T)$ gravity theory”, at the International Conference on Emerging Trends in Mathematics and Scientific Computing (ICETMSC'24), organized by the Department of Mathematics and Statistics, School of Applied Science and Humanities at Vignan's Foundation for Science, Technology and Research (Deemed to be University), Andhra Pradesh, India, held on June 13-15, 2024.
- Participated in a Five- Day FDP on “Recent Developments in Statistics and its Applications in Data Science” organized by the Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Chennai on 27th – 31st March 2024.
- Participated in the Five Day International Virtual Faculty Development Program on “Mathematics and its Application” organized by Department of Mathematics(PG), PSGR Krishnammal College for Women, Coimbatore from 11.03.2024 to 15.03.2024.
- Participated in the Online Workshop on Numerical and Analytical Relativity (NAR 2024) organized by the Department of Applied Sciences, Indian Institute of Information Technology, Allahabad, from 20th to 22nd March 2024.
- Participated in the webinar ‘Recent Progress in Mathematical Sciences’ organized by the Department of Mathematics, Government Engineering College Bhojpur, Bihar, India on March 14, 2024.
- Participating in the webinar on introduction to Einstein's General Theory of Relativity held on October 29, 2023, from 8:00 pm to 10:00 pm.
- Participated in the two day online workshop on “R Programming for Research” organized by Division of Mathematics, School of Advanced Sciences from 29th to 30th May 2023 at Vellore Institute of Technology, Chennai.
- Participated in two days workshop on Python Programming in Astronomy, Astrophysics & Cosmology organized by Department of Applied Sciences, G H Rasoni College of Engineering, Nagpur funded by IUCAA Pune from April 07-08, 2023.

Conferences and Workshops Attended (continued)

- Participated in the 3-Day Online FDP on “Differential Equations & its Applications” organized by Division of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Chennai from 03rd February to 05th February 2023.
- Participated and completed One Week Online Faculty Development Program on “LaTeX and MATLAB (L&M-2023)” organized by Department of Mathematics, G H Rasoni College of Engineering, Nagpur Sponsored by Atomic Minerals Directorate for Exploration and Research (AMD), DAE, Govt. of India, Hyderabad.
- Presented the paper titled “Stability analysis of cosmological models coupled minimally with scalar field in $f(Q)$ gravity”, in International Conference on Computational Mathematics (ICCM-2023) organized by Department of Mathematics, Sadguru Gadage Maharaja College, Karad on 3rd February 2023.
- Participated in the online workshop entitled “WORKSHOP ON RECENT PROGRESS IN ASTROPHYSICS (WRPA-2022)” organized by Department of Physics, Amity Institute of Applied Sciences held on 17th of November, 2022.
- Participated in the workshop “Galaxy Formation and Evolution Across The Cosmic Time (GFEACT-2022)” organized by Department of Physics, Siksha Bhavana, Visva-Bharati, Santiniketan, West Bengal, Pin-731235, India held on 13th & 14th December, 2022.
- Participated in this seminar “International Seminar on Indian Mathematicians and their Contributions (ISIMC-2022)” to commemorate the 135th birth anniversary of legendary Indian Mathematician Srinivasa Ramanujan, organized by Department of Mathematics, School of Physical Sciences, Central University of Karnataka, Kalaburagi-585 367, India.
- Participated in the One day National Webinar on “RESEARCH METHODOLOGY” organized by Department of Mathematics, St. Joseph University, Chumoukedima, Nagaland held on 20.09.2022.