



BITS Pilani
Hyderabad Campus
Department of Mathematics

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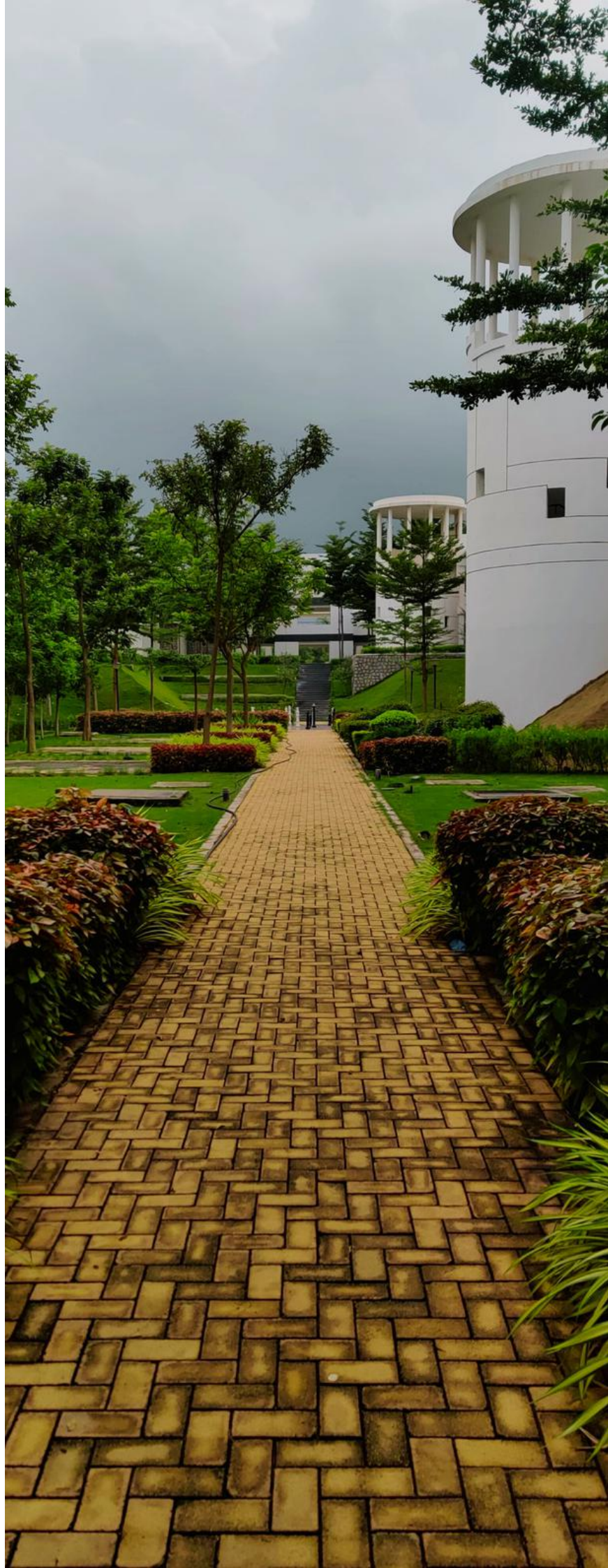


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Good mathematicians see analogies
between theorems; great mathematicians
see analogies between analogies.

- **Stephan Banach**

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$2^{136279841}-1$ is
the largest known
prime & it has around
41 million digits.



About Us



The Department of Mathematics was established in 2008, along with the Hyderabad Campus of BITS Pilani. Presently, the department offers Integrated MSc, PhD in Mathematics, and Minor in Data Science in collaboration with the Computer Science Department. We also offer various courses and programs to industry professionals through Work Integrated Learning Programs (WILP).

The department has 28 faculty members, of which 3 are professors, 12 are associate professors, and 13 are assistant professors. Our faculty members are actively engaged in conducting research in multi-dimensional areas of Mathematics such as Algebra, Analysis, Applied Statistics, Computational Fluid Dynamics, Cosmology & Relativity, Cryptography, Differential & Integral Equations, Graph Theory, Mathematical Modeling, Number Theory, and Quantum information.

Since its establishment, the department has awarded 25 PhDs, the recipients of which are now working in reputed institutions or pursuing Post-Doctoral research abroad. Currently, the department has 64 PhD students. The department has a well-furnished computational lab with 20 computers equipped with MATLAB, Mathematica and Statgraphics. It has one main node and two computational nodes. This is supported by the FIST grant received by DST, Govt. of India.

Welcoming the New HoD of the Mathematics Department



We are honored to share that our esteemed **Prof. P.K. Sahoo** has officially handed over the reins of the department to **Prof. N. Kishore Kumar** on 1st October, 2024. Prof. Sahoo's tenure as Head of Department has been a journey marked by visionary leadership, commitment, and unwavering support to faculty and students alike. Under his guidance, the department has flourished in both academic and research arenas, fostering an environment that encouraged growth, innovation, and collaboration.

As Prof. Sahoo transitions from this role, we extend our deepest gratitude for his invaluable contributions, mentorship, and dedication to our community. We are equally thrilled to welcome Prof. Kishore Kumar as the new HoD, confident that his expertise and fresh vision will lead our department into an exciting new chapter. We look forward to Prof. Kishore Kumar's leadership as we continue to uphold the department's legacy and strive for excellence together.

Academic Invited Talks



Prof. Anish Ghosh from **TIFR, Mumbai**, gave a session titled “**From chaos to arithmetic**” to kick off the Department of Mathematics' seminar series this semester on 15th of October, 2024. He gave a brief overview of ergodic theory, a field of mathematics that studies chaotic dynamics, and then discussed how it relates to the seemingly orderly realm of numbers.



A presentation by **Prof. Andronikos Paliathanasis** of **Durban University of Technology**, South Africa, was arranged by the Department of Mathematics on 28th of October, 2024. The topic of Prof. Andronikos' presentation was “**The Common Solution Space of General Relativity and Modern Cosmology.**”



The Department of Mathematics hosted an online talk by **Prof. Patrick E. Farrell** from the University of Oxford on 16th October 2024. The topic of the talk was “**Designing Conservative and Accurately Dissipative Numerical Integrators in Time.**”

AXIOM Events



The Mathematics Association, **AXIOM** conducted “**Sudostar**”, an elimination-based Sudoku competition featuring 9x9, 3D, and special-format puzzles. With over 50 participants, AXIOM’s first event of 2024–25 was a success.

Achievements & Travel Grants

Prof. Kishore Kumar visited Westsächsische Hochschule Zwickau and DLR Koln from October 3 to 14, 2024.



- **Prof. P. K. Sahoo** has joined as an editorial board member of *Open Physics* journal having impact factor 1.8 (A De Gruyter publication).
- In addition to that, he has been appointed as an International Advisory Board member of the Q3 journal *Trends in Science*.



Tapashwini Patro received a travel grant from DST-SERB and support from OIST, Japan, to present her research poster at the *19th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2024)*, hosted in **Okinawa Institute of Science and Technology**, Japan from September 9–13, 2024.

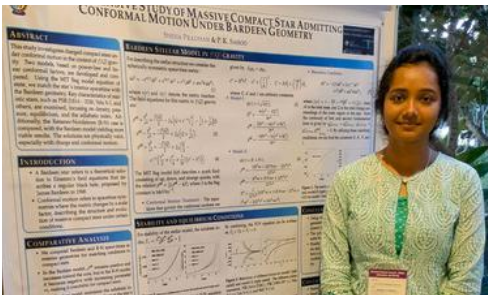
Sayantana Ghosh undertook a visit to IUCAA Pune in a Visiting Position to foster research and collaboration from October 22 to November 4, 2024.



Achievements & Travel Grants



- **Sneha Pradhan** was awarded an international travel grant to attend the *Indo-French Astronomy School*, co-organized by the **University of Lyon** and **IUCAA Pune** during October 4-11, 2024.



- She also secured the BITS International Travel Grant to showcase her poster at the *Quantum Extreme Universe: Matter, Information, and Gravity conference* at **Okinawa Institute of Science and Technology**, Japan, held from October 21–25, 2024.

Akanshya Sahu earned the international travel grant from BITS to attend *The 26th Japan Conference on Discrete and Computational Geometry, Graphs, and Games (JCDCGGG) 2024* hosted by **Tokyo University of Science**, Kagurazaka Campus, Tokyo, Japan during 10-12 September, 2024.



Conferences and Workshops



Santanu Kumar Dash and **Kailash Chand Swami** (left to right) attended *The ninth International Conference on Ships and Offshore Structures (ICSOS) 2024* hosted by **Indian Institute of Technology Madras**, Chennai, India during 8 - 12 September, 2024.

Santanu Kumar Dash, **Kailash Chand Swami** and **Parothidil Anjusree Krishnan** attended *The 15th ISOPE Pacific Asia Offshore Mechanics Symposium* hosted by **Indian Institute of Technology Madras**, Chennai, India during 13-16 October, 2024.



Conferences and Workshops



Gaurav Gadbail, Zinnat Hassan, Moreshwar Tayde, Sai Swagat Mishra and Sayantan Ghosh (left to right) attended *Contemporary Issues in Astronomy and Astrophysics-2024(CIAA-2024)* (13-15 September, 2024). The event was organised by Department of Physics, **Shivaji University** in collaboration with **IUCAA, Pune**.

Sayantan Ghosh, Prof. P.K. Sahoo and Raja Solanki (left to right) participated the *17th International conference on interconnections between Particle Physics and Cosmology (PPC 2024)* hosted by **IIT Hyderabad** and **University of Hyderabad** (14-18 October, 2024).



PhD Awardees

Scholar: **Ms. Tapaswini Patro** (2019PHXF0037H)
 PhD Thesis: **A Study on the Various Aspects of Quantum Entanglement**
 Supervisor: **Prof. Nirman Ganguly**
 Viva-voce: **27th September, 2024**



Scholar: **Mr. Hirendra Kumar Garai** (2019PHXF0465H)
 PhD Thesis: **Study on Cryptanalysis of ARX-based Ciphers**
 Supervisor: **Prof. Sabyasachi Dey**
 Viva-voce: **18th October, 2024**

Scholar: **Ms. Parothidil Anjusree Krishnan** (2020PHXF0108H)
 PhD Thesis: **Modeling the Wave Energy Converter Devices using Computational Fluid Dynamics**
 Supervisor: **Prof. Santanu Koley**
 Viva-voce: **30th October, 2024**



Publications

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* indicates Q1 journal

- Alwan, M. A., Inagaki, T., Mishra, B., and Narawade, S. A. (2024). [Neutron star in covariant \$f\(Q\)\$ gravity](#). Journal of Cosmology and Astroparticle Physics, 2024(09), 011. *
- Bhar, P., Shahzad, M. R., Mandal, S., and Sahoo, P. K. (2024). [Modeling and analyzing stability of hybrid stars within \$f\(Q\)\$ gravity](#). Physics of the Dark Universe, 101686. *
- Dash, S. K., and Koley, S. (2024). [Iterative boundary element method for modeling an inverted T-type porous barrier in presence of ocean currents](#). The European Physical Journal Special Topics, pp.1-21.
- Dash, S. K., Trivedi, K., Koley, S., and Mondal, S. (2024). [Modeling the hydrodynamics of the OWC device placed over an undulated seabed in the presence of ocean current](#). Alexandria Engineering Journal, 111, pp. 341-356. *
- Dash, S. K., Koley, S., and Zheng S. (2024). [Performance of an oscillating water column wave energy converter device under random ocean waves and ocean currents](#). Physics of Fluids 1 October 2024; 36 (10): 107165. *
- Devi, Y. K., Narawade, S. A., and Mishra, B. (2024). [Constraining parameters for the accelerating universe in \$f\(R, L_m\)\$ gravity](#). Physics of the Dark Universe, 46, 101640. *
- Gadbail, G. N., Bouali, A., and Sahoo, P. K. (2024). [Statistical and cosmological analysis of Weyl-type \$f\(Q, T\)\$ models with the \$\Lambda\$ CDM Paradigm](#) Nuclear Physics B.
- Jaybhaye, L. V., Solanki, R., and Sahoo, P. K. (2024). [Late time cosmic acceleration through parametrization of Hubble parameter in \$f\(R, L_m\)\$ gravity](#). Physics of the Dark Universe, 46, 101639. *
- Kadam, S. A., Duchaniya, L. K., and Mishra, B. (2024). [Teleparallel gravity and quintessence: The role of nonminimal boundary couplings](#). Annals of Physics, 470, 169808. *
- Ketana Kakani, P. K. P., and Koley, S. (2024). [Data Analysis Demystified: Data Analysis Demystified: A Beginner's Step-by-Step Guide](#) *
- Kolhatkar, A., Mishra, S. S., and Sahoo, P. K. (2024). [Investigating early and late-time epochs in \$f\(Q\)\$ gravity](#). The European Physical Journal C, 84(9), 888. *
- Kumar, M., and Bhawna (2024). [Introduction to Machine Learning](#). In: Namasudra, S. (eds) IoT and ML for Information Management: A Smart Healthcare Perspective. Studies in Computational Intelligence, vol 1169. Springer, Singapore.
- Kumar, M. and Bhawna (2024). [Winowed Octonion Quadratic Phase Fourier Transform: Sharp Inequalities, Uncertainty Principle, and Examples in Signal Proessing](#). IEEE Access. vol. 12, pp. 146771-146794. *
- Kumar, M., and Bhawna. (2024). [Octonion quadratic-phase Fourier transform: inequalities, uncertainty principle, and Examples](#). Journal of Inequalities and Applications, 2024(1), 134.
- Kumawat, S., Boyina, K., Vishwakarma, S. K., and Piska, R. (2024). [Characteristics of wave propagation in pre-stressed viscoelastic Timoshenko nanobeams with surface stress and magnetic field influences](#). European Journal of Mechanics-A/Solids, 108, 105423. *
- Lima, F. C. E., Belchior, F. M., Almeida, C. A. S., and Sahoo, P. K. (2024). [On the asymmetric non-canonical braneworld in five dimensions](#). The European Physical Journal Plus, 139(9), pp. 1-12.

— Publications

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* indicates Q1 journal

- Mohanty, D., Ghosh, S., and Sahoo, P. K. (2024). [Charged gravastar model in noncommutative geometry under \$f\(T\)\$ gravity](#). Physics of the Dark Universe, 101692. *
- Mishra, B., Kadam, S. A., and Tripathy, S. K. (2024). [Scalar field induced dynamical evolution in teleparallel gravity](#). Physics Letters B, 857, 138968. *
- Mustafa, G., Hassan, Z., and Sahoo, P. K. (2024). [Deflection of light by wormholes and its shadow due to dark matter within modified symmetric teleparallel gravity formalism](#). Classical and Quantum Gravity. *
- Pradhan, S., Hassan, Z., and Sahoo, P. K. (2024). [Wormhole geometries supported by strange quark matter and phantom-like generalized Chaplygin gas within \$f\(Q\)\$ gravity](#). Physics of the Dark Universe, 46, 101620.
- Pradhan, S., Solanki, R., and Sahoo, P. K. (2024). [Cosmological constraints on \$f\(Q\)\$ gravity models in the non-coincident formalism](#). Journal of High Energy Astrophysics, 43, pp. 258-267.
- Swami, K. C., and Koley, S. (2024). [Scattering of water waves by thick porous breakwater placed over sloped rigid seabed in the presence of ocean current](#). The European Physical Journal Special Topics, pp. 1-15.

— Know a Mathematician : Stefan Banach



Stefan Banach, one of the 20th century's most influential mathematicians, founded modern functional analysis and contributed greatly to the theory of topological vector spaces, as well as measure and integration. Banach's academic talents were recognized early on, and he grew up in a stable environment after being sent to live with another family by his father, with whom he maintained a good relationship. After World War I, Banach received an assistantship at Lwow Polytechnic, thanks to Professor Hugo Steinhaus. Remarkably, he earned his doctorate without formally graduating.

“Mathematics is the most beautiful and most powerful creation of the human spirit.”

— Our Faculty

Prof. Jhuma Sen Gupta

Prof. Jhuma Sen Gupta, an esteemed faculty member of the Mathematics Department at BITS Pilani, Hyderabad, has been making significant contributions to both teaching and research since joining the institution in December 2017. With an impressive academic background, she holds a PhD in Mathematics from IIT Guwahati, where she worked under the guidance of Prof. Rajen Kumar Sinha. Prof. Sen Gupta further honed her research skills during her postdoctoral fellowship at PUC Santiago, Chile, where she collaborated with Prof. Norbert Heuer on numerical analysis and partial differential equations.

Prof. Sen Gupta's primary research interests lie in the numerical analysis of partial differential equations, with a particular focus on the convergence analysis for Galerkin finite element method, weak Galerkin method, discontinuous Petrov Galerkin method for parabolic problems. Over the years, her work has garnered attention, leading to numerous publications in prestigious international journals such as Journal of Scientific Computing, Numerical Methods for Partial Differential Equations, and Computational Methods in Applied Mathematics etc.

Prof. Jhuma Sen Gupta has been invited to deliver several notable talks at prestigious conferences and universities, both in India and abroad. She has spoken on topics like the Discontinuous Petrov-Galerkin (DPG) method for parabolic problems at institutions such as



Universidad del Bio-Bio and Universidad Técnica Federico Santa María in Chile, while also speaking at the RMS 2023 hosted by IIT Guwahati. She has also presented her research at international conferences like MAFELAP at Brunel University, London, and WONAPDE in Concepción, Chile.

In addition to her research, Prof. Sen Gupta has been involved in several funded projects, including a Research Initiation Grant from BITS Pilani and a major project funded by DST-SERB (CRG), India, aimed at developing weak Galerkin methods for parabolic problems.

Currently, she is supervising two PhD students.

First Degree Alumni



Alekhya Katreddy

Alekhya Katreddy, a 2020 graduate of BITS Pilani, Hyderabad Campus, holds a dual degree in Mathematics and Electronics & Instrumentation. At BITS, she served as secretary of the Maths Association “AXIOM” and worked as a TA for Discrete Mathematics. Her academic projects included studying Wormhole Geometry and encrypting images using chaos theory.

Professionally, Alekhya interned at ServiceNow, developing an iOS app, and later joined F5 Networks as a Software Development Engineer, specializing in network security and cryptography. Her growing passion for Data Science led her to leave F5 after 3.5 years to pursue formal education in the field and advance her skills.

Shailaja Gollapudy

Shailaja Gollapudy graduated from BITS Pilani, Hyderabad Campus in 2017 with a dual degree in Mathematics and Computer Science. During her time at BITS, she co-authored a paper titled "Domination on Circulant Graphs of 2 Chord Length" in Electronic Notes in Discrete Mathematics (Elsevier) under the guidance of Prof. Micheal Alphonse. Shailaja was actively involved in the Maths association “AXIOM” as an Event Coordinator and also served as a teaching assistant for the WILP program in the Mathematics Department. Her internship experiences include working at IGCAR, where she developed a fuzzy-based pressure control system for a power plant, and at Microsoft, where she applied NLP techniques to create an Employee Feedback Dashboard. Shailaja is currently a Senior Software Developer at Nutanix, where she provides solutions that integrate storage, computing, and virtualization into a unified software-defined platform.



Raghavender Reddy Vedire

Raghavender Reddy Vedire, a BITS Pilani graduate, pursued his Master's degree in Computer Science at the University of Pennsylvania, specializing in distributed systems, big data, and machine learning. During his time at BITS, Raghavender had the opportunity to publish a research paper under the guidance of Professor P.K. Sahoo.

Currently, he works as a Software Engineer at Salesforce in San Francisco, focusing on Availability and Observability. Beyond academics and work, Raghavender cherishes the lasting friendships he built at BITS and values the strong, supportive alumni community, which remains connected worldwide.

PhD Alumni



Dr. N. S. Gopal

Assistant Professor,
Presidency College, Bangalore

Dr. N. S. Gopal has completed his Ph.D. Degree under the supervision of Prof. Jagan Mohan J and Prof. Dipak K. Satpathi in the field of Discrete Fractional Calculus and Nonlinear Analysis. He has worked with the fractional nabla operator and introduced the fractional nabla Hilfer operator along with a few important properties of the same. He has worked on various results for the existence, uniqueness and existence of positive solutions for fractional difference equations. He has published eleven research papers in highly reputed international journals. He also presented his research works at various national and international conferences. To his credit, he has qualified both CSIR-JRF and GATE in 2018. He is currently working as an Assistant Professor in Presidency College Bangalore.

PhD Thesis: Study of Discrete Fractional Calculus and Nonlinear Algebra

Supervisor: Prof. Jagan Mohan J/
Prof. Dipak K. Satpathi

Year of Conferral : 2023

Dr. Simran Arora

JSPS Postdoctoral Fellow
Kyoto University, Japan

She has been awarded two prestigious postdoctoral positions: the JSPS Postdoctoral Fellowship 2024 for research in Japan, and a post at the Institute of Theoretical Physics and Cosmology at Zhejiang University of Technology, China. She has also served as an Assistant Professor at the Department of Mathematics, Chandigarh University, Punjab after her PhD. Her research is centered on dark energy and dark matter models, utilizing cosmological observations. With more than 32 publications in leading international journals, Dr. Arora has made substantial contributions to advancing our understanding of the dark sector of the universe. She was awarded the Best PhD Thesis Award 2023 by the international journal "Symmetry" in recognition of her outstanding thesis work. Her dedication has led her to present her research on prominent global stages, including delivering talks at the "Gravity and Cosmology 2024" workshop at YITP, Kyoto University, Japan (January 29 - March 1, 2024), and the "Quantum Gravity, Random Geometry and Holography" program at Institut Henri Poincare, Paris, France (January 9 – February 17, 2023). As a rising researcher in Cosmology, she was honored with the "Young Relativist Award" at the 2022 International Conference of Differential Geometry and Relativity, in collaboration with the Tensor Society, hosted by the Department of Mathematics, Kuvempu University, Shivamoga-Karnataka, India.



PhD Thesis: Late Time Acceleration with Observational Constraints in Modified Theories of Gravity

Supervisor: Prof. Pradyumn Kumar Sahoo

Year of Conferral : 2023



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Hyderabad Campus
Department of Mathematics

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