BITS Pilani
Hyderabad Campus
Department of Mathematics

JULY-AUGUST 2024
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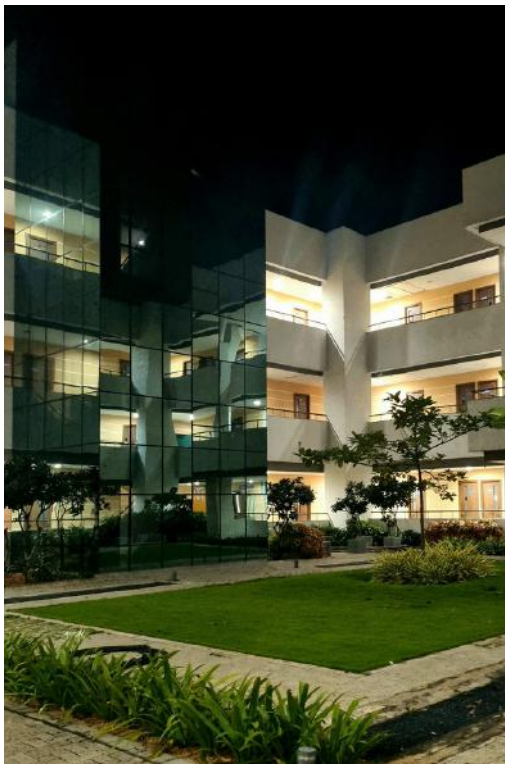
> In mathematics the art of proposing a question must be held of higher value than solving it.
>
> -- Georg Cantor

EVENTS

Persona Grata

About Us

Vice Chancellor Prof. V. Ramgopal Rao during his visit to the department on 3rd August 2024.



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, 13 are associate professors, and 12 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 22 PhDs, the recipients of which are now working in reputed institutions or pursuing Post-Doctoral research abroad. Currently, the department has 67 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.

Academic Visits

Dr. Jhuma Sen Gupta delivered a talk at SciCADE 2024 on the weak Galerkin mixed FEM for parabolic interface problems held at the National University of Singapore, Singapore during 15-19 July 2024.

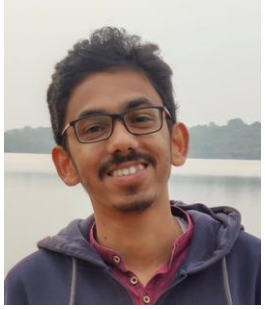
Prof. Manish Kumar visited IIIT Allababad for collaborative research work during 20-30 August 2024.

Mr. Niklas Loewer from Institut für Theoretische Physik, Universität Leipzig (Adress: Brüderstraße 16, 04103 Leipzig) has joined as an intern under **DAAD RISE Worldwide Program** at BITS Pilani, Hyderabad Campus. He is working under the supervision of **Prof. P.K. Sahoo**, Department of Mathematics from July 29, 2024 to September 6, 2024

Travel Grants

Sangeeta Dhawan received the International Travel Grant Award from BITS to attend the 20th International Conference on Fractional Differentiation and its Applications (ICFDA 2024), at the University of Bordeaux, France.

Aleena Philip received the '9th European Congress of Mathematics Grant' to participate in the 9th European Congress of Mathematics at the University of Seville, Spain.



Amit Kumar Pal Received financial support to attend SciCADE 2024 conference held in NUS, Singapore by CSIR, Government of India under the CSIR Foreign Travel Grant scheme.

Conferences and Workshops

A Guru Charan attended the Workshop "Annual Foundation Schools-III" held at IIST Thiruvanant--hapuram, Kerala during 17 June to 13 July 2024.

Gaurav N. Gadbail attended the Workshop on "Relativistics Cosmology: Theoretical and Data Analysis Techniques" held at GHRCE, Nagpur during 15-17 July 2024.

VIT Bhopal University conducted a conference in hybrid mode entitled "International Conference on Nonlinear Analysis & Computational Techniques (ICNACT - 2024)" during 8-10, August 2024.

Online Paper Presentations @ ICNACT 2024

From left to right

- **Santanu Kumar Dash** presented a paper on "Performance of an onshore OWC device placed over a sloping bottom foundation under oblique incident waves."
- **Kailash Chand Swami** presented a paper on "Mathematical Modeling of the Viscoelastic Floating Membrane placed over an Undulated Seabed in the Presence of Partially Reflection Wall."
- **Sangeeta Dhawan** presented a paper on "Solvability of Discrete Fractional Boundary Value Problems with Nonlinear Nonlocal Boundary Conditions in Banach Spaces."
- **Amya Ranjan Ray** presented a paper online on "Hydrodynamic performance of a parabolic Overtopping WEC device using RANS model."
- **Rajdip Dey** presented a paper online on "Experimental and Computational Approach on the Performance of a Vertical Surface-Piercing Cylindrical Barrier in a Compact Wave Flume setup."

Conferences and Workshops

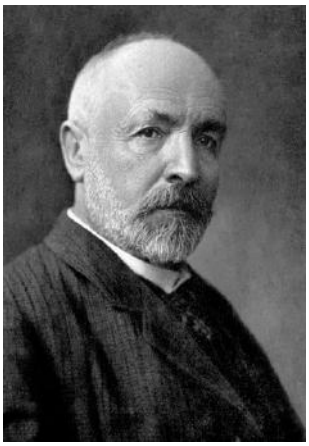
Amya Ranjan Ray participated in the workshop IEEE ICEEICT 2024 held at K. Ramakrishnan College of Engineering, Tiruchirappalli, Tamil Nadu during 24-27 July 2024.

7 is the only prime number followed by a cube.

Debasmita Mohanty and **Ruddarraju Amrutha** attended the IWM conference held at BITS Pilani, K K Birla Goa Campus, during 11-13 July 2024. At this conference, **Debasmita Mohanty** presented a paper on “Study of Charged Gravastar Model in f(Q) Gravity” .

Debismita Nayak participated in “International Workshop on Recent Trends in Applied Mathematics for Engineering & Technology” [RTAMET- 2024], Amity University, Madhya Pradesh during 5-7 Aug 2024.
Also, she presented a paper on “Evaluating Head loss in the Human femoral arterial network”, at ICAESM -2024 held at Radhakrishna Institue of Technology and Engineering, Bhubaneswar, Odisha, during 30-31 Aug 2024.

Know a Mathematician : ***Georg Cantor***



Georg Cantor (1845–1918) was a German mathematician best known for founding set theory and introducing the concept of infinity in mathematics. Cantor proved that not all infinities are equal, famously showing that the set of real numbers is “larger” than the set of natural numbers. His work laid the foundation for much of modern mathematics, despite initial resistance from contemporaries who found his ideas controversial. One can have a look in the book **The Mystery of the Aleph: Mathematics, the Kabbalah and the Search for Infinity** by Amir D. Aczel for an overview of Cantor’s work.

The essence of mathematics lies in its freedom.

Publications

* indicates Q1 journal

- **Bhagat, R.** and **Mishra, B.**, (2024). Observational constrained Weyl type f(Q, T) gravity cosmological model and the dynamical system analysis. *Astroparticle Physics,* 163, pp.1-12. *
- **Dash, S. K.**, **Koley, S.**, **Paul, S.**, **Dey, R.** and **S., Maheswaran**, (2024). Performance of multilayered porous breakwater under irregular waves having different spectrum. *Engineering Reports*, pp.1-19.
- **Gadbail, G. N.,** Arora, S., **Sahoo, P.K.** and Bamba, K., (2024). Reconstruction of the singularity-free f(R) gravity via Raychaudhuri equations. (Volume 84), Number 752, pp.1-12.
- **Ghosh, S., Solanki, R.** and **Sahoo, P.K.,** (2024). Dynamical system analysis of Dirac-Born-Infeld scalar field cosmology in coincident f(Q) gravity. *Chinese Physics C*, (Volume 48), Number 9, pp.1-15. *
- **Hassan, Z.** and **Sahoo, P.K., (**2024). Possibility of the Traversable Wormholes in the Galactic Halos within 4D Einstein-Gauss-Bonnet Gravity. *Annalen Der Physik*, 536, pp.1-16.
- Kavya, N. S., **Mishra, S. S., Sahoo, P. K.** and Venkatesha, V., (2024). Can teleparallel f(T) models play a bridge between early and late time Universe? *Monthly Notices of the Royal Astronomical Society,* (Volume 532), Issue 3, pp. 3126–3133. *
- **Koley, S., Parothidil, A. K., Ray, A. R.** and Krasovsky, A., (2024). Performance of dual-chamber oscillating water column device under irregular incident waves using Reynolds averaged Navier–Stokes model. *Engineering Reports*, pp.1-31.
- **Kumawat, S.,** Malkoti, A. and **Vishwakarma, S. K.**, (2024). A Cell-Centered Implicit Finite Difference Scheme to Study Wave Propagation in Acoustic Media: A Numerical Modelling. *Journal of sound and vibrations*, (Volume 590), pp.1-18. *
- **Kumawat, S., Vishwakarma, S. K.**, Das, S. and Panigrahi, T. R., (2024). Elastodynamics response of torsional waves in Sinusoidal Conical Notch. *Journal of Vibration Engineering & Technologies*, pp.1-12.
- **Mishra, S. S.,** Kavya, N. S., **Sahoo, P. K.** and Venkatesha, V., (2024). Constraining Extended Teleparallel Gravity via Cosmography: A Model-independent Approach. *The Astrophysical Journal*, (Volume 970), Number 1, pp.. *
- **Mohanty, D.** and **Sahoo, P.K.**, (2024). Gravastar Model in Krori–Barua Metric Under f (Q) Gravity. *Fortschritte der Physik*, 72, pp.1-13. *
- **Philip, A.**, Gupta, M. and **Baweja, D.**, (2024). λ -Limited Sets in Banach and Dual Banach Spaces. *Bulletin of the Brazilian Mathematical Society, New Series 55,* 3, 41, pp.1-19.
- **Sharma, N. K.**, **Garai, H. K.** and **Dey, S.**, (2024). Breaching Forró's Security with Differential-Linear Foray. *IEEE Access*, (Volume 12), pp.99175-99182. *
- **Soundararajan, A.** and **Barbhuiya, F. P.**, (2024). Transient analysis of a bulk stream queue with arbitrarily distributed arrival intervals. RAIRO- Operations Research, (Volume 58), Number 4, pp.2767-2782.
- **Swami, K. C.** and **Koley, S.**, (2024). Wave trapping by porous breakwater near a rigid wall under the influence of ocean current. *Nature Scientific Report,* 17, pp.1-24. *

Our Faculty

Prof. Sumit Kumar Vishwakarma

Prof. Sumit Kumar Vishwakarma is an esteemed Associate Professor in the Department of Mathematics at BITS-Pilani, Hyderabad Campus. With a robust academic foundation, he earned his Ph.D. and M.Sc. degrees from the Indian Institute of Technology (ISM) in Dhanbad in 2014, and Post-doctoral research from Harbin Engineering University, China, specializing in the intersections of mathematics and geophysics. His research primarily focuses on theoretical seismology, Elastic wave dispersion in layered structures, and solid mechanics.

Prof. Vishwakarma has successfully led several prominent research projects, including his role as Principal Investigator for the SERB-DST Early Career Research Award, where he compared phase velocities of Rayleigh waves, Love waves, and Torsional waves in various anisotropic geo-media. He has also collaborated internationally on a research project with Harbin Engineering University in China, concentrating on potential wells and their applications. Recently, Prof. Vishwakarma is working in collaboration with Tokyo University of Science, Tokyo and has been awarded with a position of Visiting Professor at TUS, Tokyo. He has also visited Tokyo Institute of Technology and presented an invited talk in the workshop and set a new collaboration work with a team there.

His contributions to academia and research have been acknowledged through numerous awards, including the DST-International Travel Support, SIAM Student Travel Award, University-immersion program, HEU, China travel support, and TUS-Tokyo International travel grant. He received the Best Paper Award at the IEEE International Conference on Advances in Engineering, Science, and Management. Additionally, his expertise is recognized through his position as an editorial board member for the International Journal of Rock Engineering and Mechanics, where he provides valuable insights into the field.

Beyond his research, Prof. Vishwakarma is actively involved in academic and professional activities, including convening 89th Conference of Indian Mathematical Society -2023 at BITS Campus, International Conference on Computational Methods in Sciences and Engineering. (CMSE-2022), Contemporary Problems on Mechanics and Vibration (CPMV-2021). His work continues to foster both national and international collaborations, solidifying his reputation as a leader in his field.

His unwavering dedication to improving the institute extends far beyond academics. He has actively participated in wide range of institutional activities. Including Practice-school at several stations and BITSAT duty at various locations. He has made significant contributions as Faculty advisor of AXIOM, Mathematics Association, Member of Academic Counselling Board (ACB), Member of Departmental Research Committee, Member of Library Committee, and Member of NAAC advisory committee.

As a dedicated mentor, Prof. Vishwakarma has guided numerous Ph.D. and M.Sc. students, offering encouragement and invaluable insights drawn from his extensive research experience. Many of his students have successfully defended their dissertations under his supervision, demonstrating his exceptional skills as an educator. Notably, Dr. Rupinderjit Kaur and Dr. Tapas Ranjan Panigrahi have successfully defended their Ph.D. dissertations under his guidance, while Sunita Kumawat and Dhrubajyoti Sarkar are currently pursuing their Ph.D. studies under his mentorship. Recently, Vijayalaxmi joined under his Co-supervision as a Part time PhD student.

Our Faculty

Prof. Sharan Gopal

Prof. Sharan Gopal is an Associate Professor in the Department of Mathematics at BITS-Pilani, Hyderabad Campus. He began his journey at BITS in June 2015 as an Assistant Professor and was promoted to his current role in March 2023. His particular focus is on Topological Dynamics. At BITS, he teaches courses such as Topology, Measure Theory, and Calculus.

Before joining BITS, he was an NBHM Postdoctoral Fellow at the Indian Statistical Institute, Bangalore, and also held a post-doctoral position at the Institute of Mathematical Sciences, Chennai. He earned his Ph.D. from the University of Hyderabad, where his thesis, supervised by Prof. V. Kannan, explored various trajectories in topological dynamics with an emphasis on periodic ones.

In addition to his teaching and mentoring roles, Prof. Gopal has been actively involved in research, securing some research grants. His projects include a DST-SERB MATRICS-funded study on ergodic theorems for Γ-actions on a group X and a DST-SERB Early Career Research Award for characterizing sets of periodic points of automorphisms on a solenoid.

Prof. Gopal has also engaged in academic collaborations and has visited renowned institutions such as Auburn University, USA, and the Central University of Kerala, India. His participation in international conferences, including the Spring Topology and Dynamical Systems Conference, reflects his active role in the areas of topological dynamics and ergodic theory.

In 2023, Dr. Faiz Imam completed his Ph.D. successfully under the supervision of Prof. Gopal, marking another milestone in his career. Presently, he is guiding Anshid Aboobacker, Purohit Nisarg Bharatbhai, and A. Guru Charan in their research, continuing to foster academic excellence and advancing mathematical research.

First Degree Alumni

Prateek Jain

Prateek Jain joined the first batch of BITS Hyderabad in 2008, where he pursued dual degree in Mathematics & ECE (Electronics & Communications Engineering). He had worked on a research project under the guidance of Prof. Pradyumn Kumar Sahoo. He co-authored a paper titled “Axially Symmetric Cosmological Model with Wet Dark Fluid in Bimetric Theory of Gravitation” (with Prof. Pradyumn Kumar Sahoo and Prof. Bivudutta Mishra) which was published in the International Journal of Theoretical Physics. He graduated in the year 2013 & joined Publicis Sapient as an DevOps Engineer & currently working as DevOps Specialist implemented E2E DevOps solutions for multiple e-commerce & banking sector companies.

Amritha Jayadev

In 2011, Amritha Jayadev joined BITS Hyderabad and obtained her dual degree in Computer Science and Mathematics. She has co-authored a research paper titled "LRS Bianchi Type-I Cosmology with Gamma Law EoS in f(R; T) Gravity" under the guidance of Prof. Pradyumn Kumar Sahoo, further solidifying her technical expertise and passion for mathematical applications in real-world scenarios. Currently, Amritha is working as a software engineer at VMware, where she designs and develops solutions that enable organizations to leverage the full potential of cloud computing, achieving the same level of flexibility and efficiency as public clouds in their private cloud operations. Prior to her current role, her academic background in mathematics laid the foundation for her analytical approach to problem-solving.

Shivaank Agarwal

Shivaank Agarwal joined BITS Hyderabad in 2016, completing a dual degree with a BE in Computer Science and an MSc in Mathematics. During his Practice School at Reliance Jio, he developed an interest in deep learning. While at BITS, he interned at the Schulich School of Engineering, University of Calgary, and the Indian Institute of Technology Bombay. He also interned at Samsung R&D Institute, Bengaluru, and Apple, California. To advance in computer vision and deep learning, he pursued an MS in Computer Science at the University of California, San Diego. He currently works as a deep learning engineer at Apple, California, focusing on deep learning algorithms for the Apple Vision Pro, primarily conducting applied research.

PhD Alumni

Dr. Tapas Ranjan Panigrahi

Assistant Professor, Department of Mathematics, Basic Science & Humanities, GIET University, Gunupur, Odisha.

Dr. Tapas Ranjan Panigrahi has completed his Ph.D. Degree under the supervision of Prof. Sumit Kumar Vishwakarma in the field of Solid Mechanics/Wave Propagation/Elastodynamics. Dr. Panigrahi has published around 14 articles in different reputed journals, conference proceedings and as in Book Chapter. During his Ph.D. tenure, he has awarded with “Best Paper Presentation” twice from IISC Bangalore and from IIT Roorkee. Currently, Dr. Panigrahi is working as an Assistant Professor in the Department of Mathematics, BSH, GIET University, Gunupur, Odisha. In addition to the teaching work, Dr. Panigrahi has also appointed as an NCC officer in GIETU, along with he has successfully supervised six M. Sc. students to complete their project work and currently two Ph.D students have joined under Dr. Panigrahi to pursue their Ph.D. Work.

PhD Thesis: Study of Phase Velocity of Seismic Waves in Anisotropic Layered Geologies

Supervisor: Prof. Sumit Kumar Vishwakarma

Year of Conferral : 2022

Dr.Sanjay Mandal

JSPS Postdoctoral fellow
Fukushima University, Japan

Dr. Sanjay Mandal, a distinguished Ph.D. alumnus from BITS Pilani, Hyderabad (2022) under the guidance of Prof. P.K. Sahoo, is a prominent figure in the field of Cosmology. Currently, a JSPS postdoctoral fellow at Fukushima University, Japan, Dr. Mandal previously held the prestigious Transilvania Postdoctoral Research Fellowship at Transilvania University, Brasov, Romania. His research primarily focuses on dark energy, dark matter, the Big Bang theory, and wormholes. With over 35 publications in top international journals, Dr. Mandal's contributions have significantly advanced our understanding of the universe. Recognized for his exceptional potential by the Japan Society for the Promotion of Science, he now collaborates with leading researcher Prof. Kazuharu Bamba in Japan. Dr. Mandal's achievements underscore his relentless pursuit of knowledge and passion for unraveling the mysteries of the cosmos, serving as an inspiration for future generations of scientists.

PhD Thesis: Accelerated Expansion of the Universe in Non-minimally Coupled Gravity

Supervisor: Prof. Pradyumn Kumar Sahoo

Year of Conferral : 2022

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