

Curriculum Vitae

Hamza Rehman S/O Muhamad Ameer Malik

Postal Address: The office of the Dr. Ghulam Abbas, Tenured Associate Professor,
Department of Mathematics, The Islamia University of Bahawalpur.

WeChat ID: Hasnainali_123

Email Address: hamzarehman244@gmail.com, hamzarehman244@zjut.edu.cn

CNIC # 36302-4435375-5

Contact Number: (+92) 307-5202428

TEACHING PHILOSOPHY

Possessing excellent problem solving, analytical and logical skills make me suitable to work as a team member as well as an individual. I am always ready to meet deadlines, do challenging work, and eager to learn new things.

ACADEMICS

Institute for Theoretical Physics and Cosmology, Zhejiang University of Technology, Hangzhou 310023, China
Postdoctoral Research in General Relativity and Cosmology
(Currently pursuing)

Doctor of Philosophy (Mathematics) **2021 - 2024**
Department of Mathematics,
The Islamia University of Bahawalpur, Pakistan.
Thesis Title: Accretion flow and Accretion Disk Around the Black Holes.

Master of Philosophy (Mathematics) **2015 - 2017**
1st Division
Center for Advanced Studies in Pure and Applied Mathematics (CASPAM),
Bahauddin Zakariya University, Multan, Pakistan.
Thesis Title: Total irregularity strength of isomorphic copies of some graphs.

Master of Science (Mathematics) **2012 - 2014**
1st Division
Center for Advanced Studies in Pure and Applied Mathematics (CASPAM),
Bahauddin Zakariya University, Multan, Pakistan.

Graduation (B. Sc.) **2010 - 2012**
1st Division
Govt College of Science Multan, Pakistan.

Intermediate (Pre-Engineering) **2008 - 2010**
1st Division
BISE D.G khan, Pakistan



EXPERIENCE

To my utmost abilities, imparting basic as well as advanced concepts of mathematics to different level of teaching over the last 10 years.

- ❖ Having 10 years teaching experience in a highly professional organizations with the core of values **DISCIPLINE, HONESTY, RESPECT** and **TOLERANCE**.
- ❖ **Two year** (2017-2019) teaching experience in **National Fertilizer Corporation (NFC), Institute of Engineering and Information Technology, Multan** and taught the subjects of Numerical Analysis, Calculus, Analytical Geometry, Probability and Statistics.
- ❖ **Three year** (2017-2020) worked as Visiting lecturer in **Institute of Southern Punjab (ISP), Multan**. The subjects were taught here Complex Analysis, Numerical Analysis, Differential Geometry, Measure Theory, Mechanics, Abstract Algebra, Linear Algebra, Set Topology, Functional Analysis, Partial Differential Equation Ring-Theory and Elements of set Theory & Mathematical logics.
- ❖ **Two year** (2018-2020) worked as a lecturer in **University of Education (UE), sub campus Multan**, and teaching the subjects of Complex Analysis and Differential Equation, Vector and Tensor Analysis.
- ❖ **One year** (2018-2019) working as a visiting lecturer in **National College of Business Administration and Economics (NCBA & E) sub campus, Multan** and taught the subjects of Real Analysis, Calculus and Elements of set Theory & Mathematical logics.
- ❖ From 10-04-2021 to present working as a visiting lecturer in **The Islamia University of Bahawalpur** and teaching the subjects of Elements of set Theory & Mathematical logics, Mathematics-I and Mathematics-II, Differential Equation and Linear Algebra, Calculus and Analytical geometry.

Skills

- ❖ Online teaching tools
- ❖ Student's research guidance
- ❖ Classroom management
- ❖ Student's Counseling
- ❖ Curriculum Development
- ❖ Computer relating software like Microsoft Office, Mathematica, Maple and MATLAB
- ❖ Mathematics Writing Software including MS Word, Scientific Workplace and Latex
- ❖ The use of Microsoft team software, Zoom Apps, Google meet and Socrative software for presenting lectures during online classes.
- ❖ Successfully Completed the 1st Pedagogical Training 2022 Organized by IUB



Research Activities

Published/ Submitted Articles

Accepted, Published and Submitted Research Articles in Highly Impact Factor International Journals,

1. **Rehman, H.**, Abbas, G., Jawad, A., Yang, R. and Mustafa, G. (2023) **Physical analysis of Rastall PFRF black hole through accretion process. Eur. Phys. J. C 83: 992.**",
2. Abbas, G. and **Rehman, H.** (2023) **Analysis of Accretion Disk Around the Euler-Heisenberg Anti-de Sitter black hole. Fortschr. Phys. 71: 2200205.**",
3. **Rehman, H.**, Abbas, G., Zhu, T. and Mustafa, G. (2023) **Matter accretion onto the magnetically charged Euler-Heisenberg black hole with scalar hair. Eur. Phys. J. C 83: 856.**",
4. **Rehman, H.** and Abbas, G. (2023) **Accretion around a hairy black hole in the framework of gravitational decoupling Theory. Chin. Phys. C 47: 125106.**",
5. Shahzad, M. R., Abbas, G., **Rehman, H.** and Ma, W.-X. (2024) **Analysis of Dyonic ModMax black hole through accretion disk. Eur. Phys. J. C 84: 461.**",
6. Abbas, G., **Rehman, H.**, Usama, M. and Zhu, T. (2023) **Accretion disc around black hole in Einstein-SU(N) non-linear sigma model. Eur. Phys. J. C 83: 714.**",
7. Shahzad, M. R., Abbas, G., Zhu, T., **Rehman, H.**, Ashraf, A. and Abidi, A. (2025) **Matter accretion around Euler-Heisenberg black hole surrounded by perfect fluid dark matter. Phys. Dark Univ. 48: 101889.**",
8. Bukhari, A., Abbas, G., **Rehman, H.**, Ashraf, A., Mahmoud, E. E. and Hakami, A. H. (2025) **Matter accretion onto the quantum-gravitationally corrected Schwarzschild black hole. Eur. Phys. J. Plus 140: 210.**",
9. Bukhari, A., Abbas, G., **Rehman, H.**, Ashraf, A. et al. (2025) **Exploring perfect fluid accretion onto quantum-corrected Reissner-Nordström black hole. Phys. Dark Univ. 47: 101794.**",
10. **Rehman, H.**, Abbas, G., Zhu, T., Wu, Q., Mustafa, G. et al. (2024) **Circular orbits of accretion flow around charged black hole coupled with a nonlinear electrodynamics field. Eur. Phys. J. C 84: 988.**"
11. **Rehman, H.**, Abbas, G., Zhu, T. and Al-Kahtani, B. S. (2025) **Dynamics of accretion disks around Euler-Heisenberg black hole in the presence of quintessence and dark matter. Phys. Dark Univ. 101944.**
12. **Rehman, H.**, Hussain, S., Abbas, G. and Zhu, T. (2025) **Constraints on extra charges in dyonic Kerr-Newman-Kasuya-Taub-NUT black hole from the observations of quasi-periodic oscillations. arXiv preprint arXiv:2507.20165**

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- ❖ Presented a paper in “GLOBAL SCIENCE TTECHNOLOGY & MANAGEMENT CONFERENCE” held on February 09-11, 2023 at the Bagdad-ul-jaded campus, **The Islamia University of Bahawalpur.**
 - ❖ Attended “International Conference on Mathematical Sciences-2022” held on March 28-29, 2022, at the Baghdad-ul-Jaded campus, **The Islamia University of Bahawalpur.**
 - ❖ Attended “4th PU International Conference on Gravitation and Cosmology” held on November 22-25, 2021 at Department of Mathematics, **University of**



Conferences/ Workshops/ Seminars

Punjab, Lahore, Pakistan.

- ❖ Attended “International Conference on Impact of Mathematics in Modern Era” held on April 08, 2021 at the Baghdad-ul-Jaded campus, **The Islamia University of Bahawalpur.**
- ❖ Attended the Webinar on *Review on Dark Energy and Modified Gravity Theories (January 08, 2021)* Organized by the Department of Mathematics, The Islamia University of Bahawalpur, Pakistan
- ❖ Attended the Webinar on *Why We Modify Theory of Gravity ? Can Torsion Based Theory of Gravity Make Situation Better (June 22, 2021).* Organized by the Department of Mathematics, The Islamia University of Bahawalpur, Pakistan.
- ❖ Attended “International Conference on Mathematics and Applications (CICMA)” held on November 06-07 2017 at the Center for Advanced Studies in Pure and Applied Mathematics (CASPAM), **Bahauddin Zakariya University, Multan, Pakistan.**
- ❖ Attended the seminars, lectures arranged during 2021 up to now in Department of Mathematics, **The Islamia University of Bahawalpur.**
- ❖ Certified with 1ST Pedagogical Training 2022 organized by **The Islamia University of Bahawalpur.**
- ❖ Attended the seminars, lectures and workshops arranged during 2011 up to 2017 in Center for Advanced Studies in Pure & Mathematics (CASPAM), **Bahauddin Zakariya University, Multan.**
- ❖ Attended as a participant of 18th International Pure Mathematics Conference 2017 organized by **The Islamia University of Bahawalpur**, Preston University and Pakistan Mathematical Society, Islamabad from August 05-07, 2017.

Research Interest

My research interests encompass various topics within the field of applied mathematics, mathematical physics, Theoretical Physics, special and general theory of relativity, Modified theories of gravity, and black hole physics.

By pursuing these research interests, I aspire to contribute to advancing our understanding of stellar structure modeling in general relativity (GR) and modified theories of gravitation and different aspects of black holes (BHs) and their profound implications for astrophysics, astronomy, cosmology, and their relation with observational evidence. Especially, the following areas constitute the core of my research pursuits:

Static and spherically symmetric accretion, accretion disk, accretion properties, circular orbits, electromagnetic properties of accretion disk, and process of spherical accretion flow, null geodesics, orbits around the BH. Extended phase space, $P-V$ criticality,



critical exponents of BH thermodynamics, BH shadow, weak and strong gravitational lensing, and topological classes of static and rotating BH thermodynamics. Different types of BH thermodynamics related to change in entropy.

