

Dr. Muhammad Zaeem-ul-Haq Bhatti

HEC Approved PhD Supervisor

Curriculum Vitae

Personal Information

Address	Department of Mathematics, University of the Punjab, Quaid-i-Azam Campus, Lahore-54590, Pakistan
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	http://www.pu.edu.pk/ggc/
Nationality	Pakistani

Education

2012–2015	PhD (Doctor of Philosophy) in General Relativity and Cosmology , <i>University of the Punjab</i> , Pakistan. <ul style="list-style-type: none">- Department of Mathematics.- Supervisor: Prof. Dr. Muhammad Sharif.- Thesis: Stability Analysis of Self-Gravitating Collapsing Systems. http://pr.hec.gov.pk/jspui/handle/123456789/9204
2010-2012	MPhil (Master of Philosophy) in Applied Mathematics , <i>University of the Punjab</i> , Pakistan. <ul style="list-style-type: none">- Department of Mathematics.- Supervisor: Prof. Dr. Muhammad Sharif.- Thesis: Structure Scalars in Charged Cylindrical and Plane Symmetries.
2008-2010	MSc (Master of Science) in Mathematics , <i>University of the Punjab</i> , Pakistan. <ul style="list-style-type: none">- Department of Mathematics.- Major: Applied Mathematics.

Practical Exposure

Lecturer in Department of Mathematics, University of the Punjab, Pakistan from May, 2014 to October, 2015.

Assistant Professor in Department of Mathematics, University of the Punjab, Pakistan since October, 2015 to Present.

Administrative Experience

Member of Departmental Admission Committee, Department of Mathematics, University of the Punjab, Lahore (2014, 2015, 2016, 2017, 2018, 2019).

Co-Coordinator of Departmental Seminar Series, Department of Mathematics,

University of the Punjab, Lahore (2014, 2015, 2016).

In charge, Accounts and Stock Taking of Departmental Computer Center, Department of Mathematics, University of the Punjab, Lahore (2014).

Secretary of the International Conference on Relativistic Astrophysics at University of the Punjab during February 10-14, 2015.

In charge, General Accounts and Stock Taking of Department of Mathematics, University of the Punjab, Lahore (2015).

Managerial Secretary of Punjab University Journal of Mathematics (**PUJM**), Department of Mathematics, University of the Punjab, Lahore, since November 04, 2015 to May 15, 2019 then May 21, 2019 to September 30, 2020.

Acting Coordinator of Departmental M.Phil. /Ph.D. Program, Department of Mathematics, University of the Punjab, Lahore-Pakistan from June 20, 2016 to August 12, 2016.

Coordinator Departmental Time Table, Department of Mathematics, University of the Punjab, Lahore, Pakistan (2016-2017).

Coordinator of M.Sc. Program, Department of Mathematics, University of the Punjab, Lahore, Pakistan from September 01, 2016 to May 15, 2019.

Organizer of the One Day Conference on Gravitation and Cosmology at University of the Punjab on November 26, 2016.

Joint Secretary of the 1st PU International Conference on Gravitation and Cosmology held at University of the Punjab, Lahore during January 27-31, 2019

Serving at the Editorial Board

- International Journal of Mathematics and Systems Science (<https://systems.enpress-publisher.com/index.php/IJMSS/about/editorialTeam>)
- Expert Opinion on Astronomy and Astrophysics (<http://ojs.whioce.com/index.php/eoaa/about/editorialTeam>)

Awards, Scholarships and Honors

2011-2012 **DPC Merit Scholarship in MPhil** by Department of Mathematics, University of the Punjab, Pakistan.

2012-2014 **Indigenous PhD Fellowship**, Higher Education Commission, Pakistan.
Research Productivity Award by Pakistan Council for Science and Technology, Pakistan in Category D for 2013-14; in Category A for 2014-15; in Category C for 2015-16; in Category D for 2016-17.

Research Incentive Awards by University of the Punjab, Pakistan in 2014, 2015, 2016, 2017, 2018.

Performance Evaluation Award by University of the Punjab, Pakistan in 2015,

2016, 2017.

Life Member of Pakistan Physical Society since November 29, 2016.

Research Projects

- Completed a research project as Principal Investigator from University of the Punjab entitled **“Effects of Reflection Symmetry on the Stability of Adiabatic Axial Collapse”** during the fiscal year 2014-2015.
- Completed a research project as Principal Investigator from University of the Punjab entitled **“Existence of Compact Celestial Bodies”** during the fiscal year 2015-2016.
- Completed a research project as Principal Investigator from University of the Punjab entitled **“Effects of Dark Energy and Dark Matter on Some Cosmic Puzzles”** during the fiscal year 2017-2018.
- Working on a research project as Principal Investigator Under National Research Program for Universities by Higher Education Commission, Pakistan entitled **“Evolution of the Universe under the Influence of Higher Order Gravitational Theories”** for two years on February 04, 2019.
- Working on a research project as Co-Principal Investigator Under National Research Program for Universities by Higher Education Commission, Pakistan entitled **“Existence of Celestial Structures in Galaxies”** for two years on February 04, 2019.

Academic and Research Interests

Geometry,
General Theory of Relativity,
Electromagnetic Theory,
Modified Gravitational Theories,
Mathematical Physics,
Astrophysics and Cosmology.

Computer and Software Skills

Math Packages	Mathematica, Maple.
OS	Windows.
Typography	MS Word, MS Power Point, Latex.

Workshops, Conferences and Seminars Attended at National/International Level

2010–Present **Weekly Departmental Seminar Series** in Department of Mathematics, PU,

Pakistan

- Oct., 2010 **Lecture Series on Black Holes**, PU, Pakistan.
- Nov., 2010 **Lecture Series on Cosmology**, PU, Pakistan.
- Nov., 2011 **NUST Conference on Mathematical Sciences**, NUST, Pakistan.
- Dec., 2011 **One Day Conference on Gravitation**, PU, Pakistan.
- Feb., 2013 **IV Italian- Pakistani Workshop on Relativistic Astrophysics**, NUST, Pakistan.
- Mar., 2013 **6th World Conference on 21st Century Mathematics**, ASSMS, Pakistan.
- Nov., 2013 **Lecture Series on Cosmology**, PU, Pakistan.
- Jan., 2014 **Symmetries, Differential Equations and Applications II**, NUST, Pakistan.
- Sep., 2014 **1st National Conference on Mathematical Sciences**, UOM, Pakistan.
- Feb., 2015 **International Conference on Relativistic Astrophysics**, PU, Pakistan.
- Mar., 2015 **1st National Conference on Pure and Applied Mathematics**, UMT, Pakistan.
- Nov., 2015 **14th Regional Conference on Mathematical Physics**, QAU, Pakistan.
- Dec., 2015 **International Conference on Recent Advances in Applied Mathematics**, COMSATS Lahore, Pakistan.
- Mar., 2016 **1st UMT International Conference on Pure and Applied Sciences**, UMT, Lahore, Pakistan.
- July, 2016 **21st International Conference on General Relativity and Gravitation**, Columbia University, New York, USA.
- Nov., 2016 **One Day Conference on Gravitation and Cosmology**, PU, Pakistan.
- April, 2017 **One Day Workshop for the Editors of Sciences Journals** by Quality Assurance Division, HEC at Margala Hotel, Islamabad.
- June, 2017 **The Southern Cross Conference: Surveying the Cosmos, The Science From Massively Multiplexed Surveys** by Australian Astronomical Observatory and CSIRO Astronomy and Space Science at Sydney, Australia.
- Jan., 2018 **One Day Workshop for the Editors of Journals of Multi-Disciplinary and Natural Sciences** by Quality Assurance Division, HEC at HEC, Islamabad.
- Mar., 2018 **Information, Black Holes and Quantum Theory: Theoretical Physics at the Crossroads** at the Abdus Salam School of Mathematical Sciences, GCU, Lahore.
- Mar., 2018 **4th International UMT Conference on Pure and Applied Mathematics (4th UICPAM)** at Faletti's Hotel by Center for Mathematics and its Applications, UMT, Lahore.
- May, 2018 **XIIth Spontaneous Workshop on Cosmology « Hot Topics in Modern Cosmology »** at Institut d'Etude Scientifique de Cargèse (IESC), Cargèse, France.
- Mar., 2019 **5th UMT International Conference on Pure and Applied Mathematics** at Center for Mathematics and its Applications, UMT, Lahore, Pakistan.

- Nov., 2019 **One Day International Seminar on Recent Trends in Pure and Applied Mathematics** at Government College University Faisalabad, Faisalabad, Pakistan.
- Feb., 2020 **6th UMT International Conference on Pure and Applied Mathematics** at Center for Mathematics and its Applications, UMT, Lahore, Pakistan.

Trainings

1. **Diploma in Fundamental of Information Technology** by Computer Centre, Govt. Islamia College Civil Lines, Lahore; June 01, 2008 to August 31, 2008.
2. **Faculty Orientation Program** by Institute of Administrative Sciences, University of the Punjab, Lahore; August 19–22, 2014.
3. **Business Edge Course Titled Communicating Effectively** by International Finance Cooperation, World Bank Group, Lahore; August 20–21, 2014.
4. **ProQuest Ebook Central Advanced Training** by ProQuest Education on September 16, 2020.
5. **ProQuest Ebook Central Advanced Training** by ProQuest Education on September 23, 2020.

Courses Taught at University of the Punjab

General Relativity-II; MA-602
Analytical Dynamics; MATH-410
Calculus (II); MATH-202
Electromagnetic Theory-I; MATH-411
Electromagnetic Theory-II; MATH-426
Geometry; MCO-501
Mechanics; MATH-310
Special Theory of Relativity; MATH-425
Vector and Tensor Analysis; MATH-304
Vectors & Mechanics-I; MATH-102
Reading & Research-MA1; MRR-671
Relativity and Cosmology; Phys 4704
Real Analysis-I; MATH-301

Talks Delivered at National/International Level

- **Structure Scalars in Charged Cylindrical and Plane Symmetries** at Department of Mathematics, University of the Punjab, Lahore-Pakistan.
- **Charged Static Axial Symmetric Solutions and Scalar Structures** at Department of Mathematics, University of the Punjab, Lahore-Pakistan; December 04, 2014.
- **Stability of the Expansion-free Charged Cylinder** in an International Conference named “Symmetries, Differential Equations and Applications II” at School of Natural Sciences, NUST, Islamabad-Pakistan during January 27-30, 2014.
- At Department of Mathematics, University of the Punjab, Lahore-Pakistan; November 12, 2014.
- **Structure Scalars in Charged Cylindrically Symmetric Relativistic Fluids** in a National Conference named “1st National Conference on Mathematical Sciences” at University of Malakand, Khyber Pakhtunkhwa-Pakistan during September 02-04, 2014.
- **Some Inhomogeneity Factors in Self-gravitating Systems** in an International Conference named “International Conference on Relativistic Astrophysics” at University of the Punjab, Lahore-Pakistan during February 10-14, 2015.
- **Gravitational Collapse and Structure Formation in General Relativity** at Department of Mathematics, University of the Punjab, Lahore-Pakistan; February 25, 2015.
- **Some Physical Factors on Expansion-free Collapse** at “1st National Conference on Pure and Applied Mathematics” at University of Management and Technology, Lahore, Pakistan during March 07-08, 2015.
- **Role of Some Physical Factors on the Stability of Collapsing System** in an International Conference named “14th Regional Conference on Mathematical Physics” at Quaid-i-Azam University Islamabad, Pakistan during November 09-14-2015.
- **Irregularity Factors for Collapsing Systems** in an International Conference named “International Conference on Recent Advances in Applied Mathematics” at COMSATS Institute of Information Technology, Lahore, Pakistan during December 17-18, 2015.
- **Energy Density Inhomogeneity in Self-Gravitating Stars** in an International Conference named “1st UMT International Conference on Pure and Applied Sciences” at Center for Mathematics and its Applications, UMT, Lahore, Pakistan during March 05-07, 2016.
- **Energy Density Irregularities in Self-gravitating Systems (POSTER)** in an International Conference named “21st International Conference on General Relativity and Gravitation” at Columbia University in New York City, USA during July 10-15, 2016.
- **COSMOLOGY: Inflation to Dark Energy (Invited Talk)** in Department of Mathematics,

University of Management and Technology, Sialkot Campus on April 09, 2017.

- **The Study of Inhomogeneous Universe Via Dynamical Variables** in an International Conference named “Surveying the Cosmos, The Southern Cross Conference” at Crystal Ballroom, Luna Park in Sydney, Australia during June 05-09, 2017.
- **Evolution of Celestial Objects in Modified Gravity** in an International Conference named “2nd International UMT Conference on Pure and Applied Sciences” at Center for Mathematics and its Applications, UMT, Lahore, Pakistan during October 05-07, 2017.
- **A Study Based on Dynamical Variables and Self-Gravitating Objects** in an International Conference named “6th International Conference on Education- Science Beyond Classroom” at University of Education, Lahore, Pakistan during March 15-17, 2018.
- **Structure Scalars and their Physical Implication on the Evolution of Celestial stars** in an International Conference named “4th International UMT Conference on Pure and Applied Mathematics (4th UICPAM)” at Faletti’s Hotel by Center for Mathematics and its Applications, UMT, Lahore during March 31-April 02, 2018.
- **Inhomogeneity Factors for a Regular Stellar Structures in Modified Gravity** in an International Workshop named “XIIth Spontaneous Workshop on Cosmology « Hot Topics in Modern Cosmology »” at Institut d’Etude Scientifique de Cargèse (IESC) Corsica, Ménasina, 20130 Cargèse, France during May 14-19, 2018.
- **Compact Objects and their Formation** in an International Conference named “5th UMT International Conference on Pure and Applied Mathematics” at Center for Mathematics and its Applications, UMT, Lahore, Pakistan during March 29-31, 2019.
- **Vectors, Tensors and Differential Geometry (Invited Talk)** at Department of Mathematics, Forman Christian College (A Chartered University), Lahore, Pakistan on December 16, 2019.
- **Instability Constraints: Stability of Celestial Objects (Invited Talk)** in an International Conference named “6th UMT International Conference on Pure and Applied Mathematics” at Center for Mathematics and its Applications, UMT, Lahore, Pakistan during February 21-23, 2020.
- **Stable/Unstable Phases of Collapsing Models (Invited Talk)** in an International Webinar named “International Webinar on Applied Mathematics and Modelling” by Virtual University of Pakistan on September. 24, 2020.

Research Evaluation

- 1 Name: Neha Ashraf, Title of Thesis: “*Some Contributions of Classical Mechanics in Thermodynamics*” (BS), Affiliation: GC University, Lahore, Pakistan, 2016.
2. Name: Iqra Ijaz, Title of Thesis: “*Gravitational Collapse of Stellar Objects*” (BS),

Affiliation: GC University, Lahore, Pakistan, 2016.

3. Name: Muhammad Waqas Ibrahim, Title of Thesis: "*Quintessence Compact Stars Satisfying Karmarker Condition*" (MPhil), Affiliation: IUB, Bahawalpur, Pakistan, 2018.
4. Name: Haleema Sadia, Title of Thesis: "*The Mathematical Modelling of Radiating Stars and their Analytical Analysis*" (MS), Affiliation: UMT, Sialkot, Pakistan, 2018.
5. Name: Ayisha Naseem, Title of Thesis: "*Modelling of Some Astrophysical Compact Objects*" (MPhil), Affiliation: UoE, Lahore, Pakistan, 2018.
6. Name: Syed Ahmad Hassaan Wasti, Title of Thesis: "*Einstein Fields Equations and Its Physical Aspects*" (MS), Affiliation: UMT, Sialkot, Pakistan, 2018.
7. Name: Tahir Mehmood, Title of Thesis: "*Mathematical Modeling of Rotating Self-Gravitating Fluids*" (MS), Affiliation: UMT, Sialkot, Pakistan, 2018.
8. Name: Tahmina Khalid, Title of Thesis: "*Dynamical Instability of Cylindrical Collapse*" (MS), Affiliation: UMT, Sialkot, Pakistan, 2020.
9. Name: Faizan Anjum, Title of Thesis: "*Mathematical Models of Non-Rotating Stars*" (MS), Affiliation: UMT, Sialkot, Pakistan, 2020.
10. Name: Muhammad Amjad, Title of Thesis: "*Cylindrically Symmetric Relativistic Fluids Through Perturbation Scheme*" (MS), Affiliation: UMT, Sialkot, Pakistan, 2020.
11. Name: Fiaz Hussain, Title of Thesis: "*Conformal Symmetries of Some Spacetimes in $f(R)$ Theories of Gravity*" (PhD), Affiliation: Affiliation: IUB, Bahawalpur, Pakistan, 2020.
12. Name: Muhammad Siddique, Title of Thesis: "*Wormhole Solutions in $f(R)$ Theory of Gravity*" (MPhil), Affiliation: Affiliation: IUB, Bahawalpur, Pakistan, 2020.
13. Name: Muhammad Tayyab, Title of Thesis: "*Joule Thomson Expansion of Non-Linear Massive Gravity Black Hole*" (MPhil), Affiliation: Affiliation: IUB, Bahawalpur, Pakistan, 2020.
14. Name: Arooj Bashir, Title of Thesis: "*Model of Stellar Interior in $f(R,T)$ Theory of Gravity*" (MPhil), Affiliation: Affiliation: IUB, Bahawalpur, Pakistan, 2020.

15. Name: Syeda Zumaira Batool Mehwish, Title of Thesis: "Study of Axial Gravitational Waves in the Background of $f(R)$ Theory" (MS). Affiliation: VU, Lahore, Pakistan, 2020.

Conference Proceedings

1. M. Sharif and **M.Z. Bhatti**: *Some Inhomogeneity Factors in Self-gravitating Systems*, *Proc. Int. Conf. Relativ. Astrophys.* (2015)48 (**Punjab University Press**).
2. **M.Z. Bhatti**: *Role of Some Physical Factors on the Stability of Collapsing Systems*, *Math. Phys.* (2018)96 (**Proceedings of the 14th Regional Conference; World Scientific**).

List of Journal Publications (Indexed by ISI-JCR)

1. Z. Yousaf, M. Y. Khlopov, **M.Z. Bhatti** and T. Naseer: *Influence of Modification of Gravity on the Complexity Factor of Static Spherical Structures*, *Monthly Notices of the Royal Astronomical Society*, **495**(2020)4334 (**Oxford University Press**).
2. **M.Z. Bhatti** and Z. Tariq: *Effects of Electromagnetic Field on the Structure of Massive Compact Objects*, *Physics of the Dark Universe*, **29**(2020)100600 (**Elsevier**).
3. Z. Yousaf, **M.Z. Bhatti** and T. Naseer: *Measure of Complexity for Dynamical Self-gravitating Structures*, *International Journal of Modern Physics D*, **29**(2020)2050061 (**World Scientific**).
4. **M.Z. Bhatti**, Z. Yousaf and A. Khadim: *Dynamical Analysis of Self-gravitating Stars in Modified Gauss-Bonnet Gravity*, *Physical Review D*, **101**(2020)104029 (**American Physical Society**).
5. Z. Yousaf, **M.Z. Bhatti**, T. Naseer and I. Ahmad: *The measure of Complexity in Charged Celestial Bodies in $f(R, T, R_{\mu\nu}, T^{\mu\nu})$ Gravity*, *Physics of the Dark Universe*, **29**(2020)100581 (**Elsevier**).
6. Z. Yousaf, **M.Z. Bhatti** and K. Hassan: *Complexity for Self-gravitating Fluid Distributions in $f(G, T)$ gravity*, *European Physical Journal Plus*, **135**(2020)397 (**Springer**).
7. **M.Z. Bhatti**, Z. Yousaf and A. Rehman: *Gravastars in $f(R, G)$ Gravity*, *Physics of the Dark Universe*, **29**(2020)100561 (**Elsevier**).
8. Z. Yousaf, **M.Z. Bhatti** and T. Naseer: *New Definition of Complexity Factor in $f(R, T, R_{\mu\nu}, T^{\mu\nu})$ Gravity*, *Physics of the Dark Universe*, **28**(2020)535 (**Elsevier**).
9. Z. Yousaf, **M.Z. Bhatti** and T. Naseer: *Study of Static Charged Spherical Structure in $f(R, T, Q)$ Gravity*, *European Physical Journal Plus*, **135**(2020)323 (**Springer**).

10. Z. Yousaf, **M. Z. Bhatti** and H. Asad, *Gravastars in $f(R, T, R_{\mu\nu} T^{\mu\nu})$ Gravity*, *Physics of the Dark Universe*, **28**(2020)100527 (**Elsevier**).
11. **M.Z. Bhatti**, Z. Yousaf and M. Yousaf, *Stability of Self-Gravitating Anisotropic Fluids in $f(R, T)$ Gravity*, *Physics of the Dark Universe*, **28**(2020)100501 (**Elsevier**).
12. **M.Z. Bhatti** and Z. Tariq: *Electromagnetic Effects on Polytropes in $f(R)$ Gravity*, *Physics of the Dark Universe*, **28**(2020)100482 (**Elsevier**).
13. **M.Z. Bhatti**, Z. Yousaf and M. Nawaz: *Spherical Collapse with Heat Dissipation in $f(R, T, R_{\nu\delta} T^{\nu\delta})$ Gravity*, *International Journal of Geometric Methods in Modern Physics* **17**(2020)2050017 (**World Scientific**).
14. **M.Z. Bhatti**: *Charged Gravastars with Cylindrical Spacetime*, *Modern Physics Letters A* **33**(2020)2050069 (**World Scientific**).
15. Z. Yousaf, A. Ikram, M. Ilyas and **M.Z. Bhatti**, *Existence of Dynamical Wormholes in $f(R)$ Gravity*, *Canadian Journal of Physics*, **98**(2020)474 (**NRS Research Press**).
16. **M.Z. Bhatti**, Z. Yousaf and Zarnoor: *Stability Analysis of Neutron Stars in Palatini $f(R, T)$ Gravity*, *General Relativity and Gravitation* **51**(2019)144 (**Springer**).
17. **M.Z. Bhatti** and Z. Tariq: *Conformally Flat Polytropes in $f(R)$ Gravity*, *European Physical Journal Plus*, **134**(2019)521 (**Springer**).
18. **M.Z. Bhatti**, K. Bamba, M. Nawaz and Z. Yousaf: *Dissipative Self-gravitating Systems in Modified Gravity*, *Journal of Cosmology and Astroparticle Physics*, **09**(2019)011 (**IOP, UK**).
19. Z. Yousaf, **M.Z. Bhatti** and M.F. Malik: *Non-reversible Evolution of Tilted Szekeres Spacetimes with $f(R)$ Gravity*, *European Physical Journal Plus*, **134**(2019)470 (**Springer**).
20. Z. Yousaf, K. Bamba, **M.Z. Bhatti** and U. Ghafoor: *Charged Gravastars in Modified Gravity*, *Physical Review D*, **100**(2019)024062 (**American Physical Society**).
21. Z. Yousaf, **M.Z. Bhatti** and S. Yaseen: *Tilted Shear-free Axially Symmetric Fluids in $f(R)$ Gravity*, *European Physical Journal Plus*, **134**(2019)487 (**Springer**).
22. **M.Z. Bhatti**, Z. Yousaf and Zarnoor: *Stability of Charged Neutron Star in Palatini $f(R)$ Gravity*, *Modern Physics Letters A*, **33**(2019)1950252 (**World Scientific**).
23. **M.Z. Bhatti**, Z. Yousaf and M. Ajmal: *Locally Isotropic Gravastars with Cylindrical Spacetime*,

International Journal of Modern Physics D, **28**(2019)1950123 (**World Scientific**).

24. M. Ilyas, Z. Yousaf and **M.Z. Bhatti**: *Bounds on Higher Derivative $f(R, \square R, T)$ Models from Energy Conditions*, *Modern Physics Letters A*, **34**(2019)1950082 (**World Scientific**).
25. Z. Yousaf, **M.Z. Bhatti** and R. Saleem: *Electromagnetic Field and Dark Dynamical Scalars for Spherical Systems*, *European Physical Journal Plus*, **134**(2019)142 (**Springer**).
26. **M.Z. Bhatti**, Z. Yousaf and A. Yousaf: *Energy Content of a Collapsing Sphere with $f(R)$ Gravity*, *International Journal of Geometric Methods in Modern Physics*, **16**(2019)1950041 (**World Scientific**).
27. **M.Z. Bhatti**, Z. Yousaf and A. Yousaf: *Tolman Mass of Spherical Fluids with Electromagnetic Field*, *Modern Physics Letters A*, **34**(2019)1950012 (**World Scientific**).
28. **M.Z. Bhatti**, Z. Yousaf and M. Ilyas: *Existence of Wormhole Solutions and Energy Conditions in $f(R, T)$ Gravity*, *Journal of Astrophysics and Astronomy*, **39**(2018)69 (**Springer**).
29. **M.Z. Bhatti**: *Stability of Celestial Objects and Adiabatic Index*, *European Physical Journal Plus*, **133**(2018)431 (**Springer**).
30. Z. Yousaf, K. Bamba, **M.Z. Bhatti** and Ume Farwa: *Dynamical Instability of Spherical Anisotropic Sources in $f(R, T, R_{\gamma\delta} T^{\gamma\delta})$ Gravity*, *European Physical Journal A*, **54**(2018)122 (**Springer**).
31. Z. Yousaf and **M.Z. Bhatti**: *Some Anisotropic Planar Stellar Models*, *International Journal of Geometric Methods in Modern Physics*, **15**(2018)1850160 (**World Scientific**).
32. Z. Yousaf, M. Sharif, M. Ilyas and **M.Z. Bhatti**: *Energy Conditions in Higher Derivative $f(R, \square R, T)$ Gravity*, *International Journal of Geometric Methods in Modern Physics*, **15**(2018)1850146 (**World Scientific**).
33. Z. Yousaf, **M.Z. Bhatti** and M. Ilyas: *Existence of Compact Structures in $f(R, T)$ Gravity*, *European Physical Journal C*, **78**(2018)307 (**Springer**).
34. **M.Z. Bhatti**, M. Sharif, Z. Yousaf and M. Ilyas: *Role of $f(G, T)$ Gravity on the Evolution of Relativistic Stars*, *International Journal of Modern Physics D*, **27**(2018)1850044 (**World Scientific**).
35. M. Ilyas, Z. Yousaf, **M.Z. Bhatti** and B. Masud: *Existence of Relativistic Structures in $f(R, T)$ Gravity*,

- Astrophysics and Space Science*, **362**(2017)237 (**Springer**).
36. **M.Z. Bhatti** and Z. Yousaf: *Stability of Anisotropic Stellar Filaments*, *Annals of Physics*, **387**(2017)253 (**Elsevier**).
 37. Z. Yousaf, M. Sharif, M. Ilyas and **M.Z. Bhatti**: *Influence of $f(R)$ Models on the Existence of Anisotropic Self-Gravitating Systems*, *European Physical Journal C*, **77**(2017)691 (**Springer**).
 38. **M.Z. Bhatti**, Z. Yousaf and M. Ilyas: *Evolution of Compact Stars and Dark Dynamical Variables*, *European Physical Journal C*, **77**(2017)690 (**Springer**).
 39. Z. Yousaf, M. Ilyas and **M.Z. Bhatti**: *Influence of Modification of Gravity on Spherical Wormhole Models*, *Modern Physics Letters A*, **32**(2017)1750163 (**World Scientific**).
 40. K. Bamba, M. Ilyas, **M.Z. Bhatti** and Z. Yousaf: *Energy Conditions in Modified $f(G)$ Gravity*, *General Relativity and Gravitation*, **49**(2017)112 (**Springer**).
 41. **M.Z. Bhatti**, Z. Yousaf and Sara Ashraf: *Charged Black String Thin-Shell Wormholes in Modified Gravity*, *Annals of Physics*, **383**(2017)439 (**Elsevier**).
 42. Z. Yousaf, **M.Z. Bhatti** and Aamna Rafaqat: *Evolution of Inhomogeneous LTB Geometry with Tilted Congruence and Modified Gravity*, *Canadian Journal of Physics*, **95**(2017)1246 (**NRS Research Press**).
 43. Z. Yousaf, **M.Z. Bhatti** and Ume Farwa: *Stability Analysis of Stellar Radiating Filaments*, *Classical and Quantum Gravity*, **34**(2017)145002 (**IOP, UK**).
 44. Z. Yousaf, **M.Z. Bhatti** and Ume Farwa: *Role of $f(R, T, R_{\gamma\delta} T^{\gamma\delta})$ Model on the Stability of Cylindrical Stellar Model*, *European Physical Journal C*, **77**(2017)359 (**Springer**).
 45. **M.Z. Bhatti**, A. Aslam and S. Ashraf: *Construction of Thin-Shell Wormholes from Metric $f(R)$ Gravity*, *Modern Physics Letters A*, **32**(2017)1750111 (**World Scientific**).
 46. Z. Yousaf, M. Ilyas and **M.Z. Bhatti**: *Static Spherical Wormhole Models in $f(R, T)$ Gravity*, *European Physical Journal Plus*, **132**(2017)268 (**Springer**).
 47. **M.Z. Bhatti**, Z. Yousaf and Sonia Hanif: *Gravitational Collapse in Generalized Teleparallel Gravity*, *European Physical Journal Plus*, **132**(2017)230 (**Springer**).
 48. **M.Z. Bhatti**, Z. Yousaf and Sonia Hanif: *Role of $f(T)$ Gravity on the Evolution of Collapsing Stellar Model*, *Physics of the Dark Universe*, **16**(2017)34 (**Elsevier**).
 49. Z. Yousaf, **M.Z. Bhatti** and Aamna Rafaqat: *Electromagnetic Effects on the Evolution of*

- LTB Geometry in Modified Gravity,*
Astrophysics and Space Science, **362**(2017)68 (**Springer**).
50. Z. Yousaf, **M.Z. Bhatti** and Aamna Rafaqat: *LTB Geometry with Tilted and Non-Tilted Congruences in $f(R,T)$ Gravity,*
International Journal of Modern Physics D, **26**(2017)1750099 (**World Scientific**).
51. **M.Z. Bhatti**, Z. Yousaf and Sonia Hanif: *Stability of Anisotropic Compact Objects in $f(T)$ Gravity,*
Modern Physics Letters A, **32**(2017)1750042 (**World Scientific**).
52. Z. Yousaf, K. Bamba and **M.Z. Bhatti**: *Role of Tilted Congruence and $f(R)$ Gravity on Regular Compact Objects,*
Physical Review D, **95**(2017)024024 (**American Physical Society**).
53. Z. Yousaf, **M.Z. Bhatti** and Ume Farwa: *Stability of Compact Stars in $\alpha R^2 + \beta(R_{\nu\delta} T^{\nu\delta})$ Gravity,*
Monthly Notices of the Royal Astronomical Society, **464**(2017)4509 (**Oxford University Press**).
54. **M.Z. Bhatti** and Z. Yousaf: *Gravitational Collapse and Dark Universe with LTB Geometry,*
International Journal of Modern Physics D, **26**(2017)1750045 (**World Scientific**).
55. **M.Z. Bhatti** and Z. Yousaf: *Dynamical Variables and Evolution of the Universe,*
International Journal of Modern Physics D, **26**(2017)1750029 (**World Scientific**).
56. **M.Z. Bhatti**, *Shear-Free Stellar Solutions in Λ -Dominated Era,*
European Physical Journal Plus, **131**(2016)428 (**Springer**).
57. Z. Yousaf, K. Bamba and **M.Z. Bhatti**: *Causes of Irregular Energy Density in $f(R,T)$ Gravity,*
Physical Review D, **93**(2016)124048 (**American Physical Society**).
58. M. Sharif and **M.Z. Bhatti**: *Binding Energy in Self-gravitating Charged Plane Symmetric Systems,*
Chinese Journal of Physics, **54**(2016)451 (**Elsevier**).
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60. **M.Z. Bhatti** and Z. Yousaf: *Influence of Electric Charge and Modified Gravity on Density Irregularities,*
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61. Z. Yousaf, K. Bamba and **M.Z. Bhatti**: *Influence of Modification of Gravity on the Dynamics of Radiating Spherical Fluids,*
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62. Z. Yousaf and **M.Z. Bhatti**: *Electromagnetic Field and Cylindrical Compact Objects in Modified Gravity,*

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63. M. Sharif and **M.Z. Bhatti**: *Stability Analysis of Axial Reflection Symmetric Spacetime*, *Monthly Notices of the Royal Astronomical Society*, **455**(2016)1015 (**Oxford University Press**).
64. M. Sharif and **M.Z. Bhatti**: *Role of Bulk Viscosity and Electromagnetic Field on the Stability of Collapsing Cylinder*, *International Journal of Theoretical Physics*, **54**(2015)2921 (**Springer**).
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67. M. Sharif and **M.Z. Bhatti**: *Stability Analysis of Expansion-free Charged Planar Geometry*, *Astrophysics and Space Science*, **355**(2015)389 (**Springer**).
68. M. Sharif and **M.Z. Bhatti**: *Dynamics and Stability of Charged Spherical Star with Tilted and Non-Tilted Congruences*, *Modern Physics Letters A*, **29**(2014)1450165 (**World Scientific**).
69. M. Sharif and **M.Z. Bhatti**: *Effects of Some Physical Factors on the Stability of Collapsing Stars*, *International Journal of Modern Physics D*, **23**(2014)1450085 (**World Scientific**).
70. M. Sharif and **M.Z. Bhatti**: *Electromagnetic Effects on the Inhomogeneity of Planar Symmetry*, *Modern Physics Letters A*, **29**(2014) 1450129 (**World Scientific**).
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74. M. Sharif and **M.Z. Bhatti**: *On the Stability of a Class of Radiating Viscous Self-Gravitating Stars with Axial Symmetry*, *Astroparticle Physics*, **56**(2014)35 (**Elsevier**).
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79. M. Sharif and **M.Z. Bhatti**: *Effects of Electromagnetic Field on Shearfree Spherical Collapse*, *Astrophysics and Space Science*, **347**(2013)337 (**Springer**).
80. M. Sharif and **M.Z. Bhatti**: *Gravitational Binding Energy in Charged Cylindrical Symmetry*, *Canadian Journal of Physics*, **90**(2012)1233 (**NRS Research Press**).
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82. M. Sharif and **M.Z. Bhatti**: *Structure Scalars for Charged Cylindrically Symmetric Relativistic Fluids*, *General Relativity and Gravitation*, **44**(2012)2811 (**Springer**).

Worked as a Reviewer for Journals

Physics of the Dark Universe;
Modern Physics Letters A;
International Journal of Theoretical Physics;
Canadian Journal of Physics;
New Astronomy;
Physica Scripta;
Open Astronomy;
Physics Letters A;
Gravitation & Cosmology;
Galaxies;
Mediterranean Journal of Physics;
Applications and Applied Mathematics: An International Journal.

Countries Visited

United States of America: To attend 21st International Conference on General Relativity and Gravitation during July 2016 for two weeks.

Australia: To attend Surveying the Cosmos, The Southern Cross Conference during June 2017 for two weeks.

France: To attend XIIth Spontaneous Workshop on Cosmology « Hot Topics in Modern Cosmology » during May 2018 for ten days.

Supervised MS/MPhil Theses

1. **Name:** Miss Sonia Hanif
Thesis Title: *Role of $f(T)$ Gravity on the Perturbative Analysis of Compact Objects*
Session: 2015-17
2. **Name:** Mr. Muhammad Ajmal
Thesis Title: *Stability Analysis of Gravastar Like Structures*
Session: 2017-19
3. **Name:** Miss Zarnoor
Thesis Title: *Stability of Neutron Stars in Palatini Formalism by*
Session: 2017-19
4. **Name:** Miss Mubeen Nawaz
Thesis Title: *Non-adiabatic Gravitational Collapse in Modified Gravity*
Session: 2017-19
5. **Name:** Mr. Ateeq-ur-Rehman
Thesis Title: *Gravastars in $f(R,G)$ Gravity*
Session: 2018-20
6. **Name:** Miss Ammara Khadim
Thesis Title: *Dynamical Instability and Modified Gravity*
Session: 2018-20
7. **Name:** Mr. Muhammad Yousaf
Thesis Title: *Evolution of Celestial Axially Symmetric Objects in $f(R,T)$ Gravity*
Session: 2018-20

MPhil in Progress

- | | |
|-----------|--------------------|
| 2019 - 21 | Miss Taiba Ashraf |
| 2019 - 21 | Mr. Furqan Hussain |
| 2019 - 21 | Mr. Suraj Khan |

PhD in Progress

1. **Name:** Miss Zoha Tariq
Thesis Title: *Evolution of Self-Gravitating Objects in Modified Gravity*
Session: 2018-21