

# Dr. Muhammad Zaeem-ul-Haq Bhatti

HEC Approved PhD Supervisor

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## Curriculum Vitae

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### Personal Information

Address	Department of Mathematics, University of the Punjab, Quaid-i-Azam Campus, Lahore-54590, Pakistan
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URL	<a href="http://pu.edu.pk/faculty/description/1640/Dr-Muhammad-Zaeem-ul-Haq-Bhatti.html">http://pu.edu.pk/faculty/description/1640/Dr-Muhammad-Zaeem-ul-Haq-Bhatti.html</a> <a href="http://www.ggc.pu.edu.pk/">http://www.ggc.pu.edu.pk/</a>
Nationality	Pakistani

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### Education

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

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### 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.

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### Administrative Experience

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

**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 Punjab University 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 Present.

**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-date.

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

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## Serving at the Editorial Board

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

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## Awards, Scholarships and Honors

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| 2011-2012  | <b>DPC Merit Scholarship in MPhil</b> by Department of Mathematics, University of the Punjab, Pakistan.  |
| 2012-2014  | <b>Indigenous PhD Fellowship</b> , Higher Education Commission, Pakistan.<br><b>Research Productivity Award</b> by Pakistan Council for Science and Technology, Pakistan in Category D for 2013-14; in <b>Category A</b> for 2014-15; in Category C for 2015-16. |
| 2014       | <b>Research Incentive Award</b> by University of the Punjab, Pakistan.   |
| 2015, 2016 | <b>Performance Evaluation Award</b> by University of the Punjab, Pakistan.<br><b>Life Member of Pakistan Physical Society</b> since November 29, 2016.   |

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## Research Project

- Completed a research project as a 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 a Principal Investigator from University of the Punjab entitled “**Existence of Compact Celestial Bodies**” during the fiscal year 2015-2016.
- Obtained a research project as a 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.

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## Academic and Research Interests

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

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## Computer and Software Skills

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

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## 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 **6<sup>th</sup> World Conference on 21<sup>st</sup> Century Mathematics**, ASSMS, Pakistan.

Nov., 2013 **Lecture Series on Cosmology**, PU, Pakistan.

Jan., 2014 **Symmetries, Differential Equations and Applications II**, NUST, Pakistan.

Sep., 2014 **1<sup>st</sup> National Conference on Mathematical Sciences**, UOM, Pakistan.

Feb., 2015 **International Conference on Relativistic Astrophysics**, PU, Pakistan.

Mar., 2015 **1<sup>st</sup> National Conference on Pure and Applied Mathematics**, UMT, Pakistan.

- Nov., 2015 **14<sup>th</sup> Regional Conference on Mathematical Physics**, QAU, Pakistan.
- Dec., 2015 **International Conference on Recent Advances in Applied Mathematics**, COMSATS Lahore, Pakistan.
- Mar., 2016 **1<sup>st</sup> UMT International Conference on Pure and Applied Sciences**, UMT, Lahore, Pakistan.
- July, 2016 **21<sup>st</sup> 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 **4<sup>th</sup> International UMT Conference on Pure and Applied Mathematics (4<sup>th</sup> UICPAM)** at Faletti's Hotel by Center for Mathematics and its Applications, UMT, Lahore.
- May, 2018 **XII<sup>th</sup> Spontaneous Workshop on Cosmology « Hot Topics in Modern Cosmology »** at Institut d'Etude Scientifique de Cargèse (IESC), Cargèse, France.

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## Trainings

- 1. Faculty Orientation Program** by Institute of Administrative Sciences, University of the Punjab, Lahore; August 19–22, 2014.
- 2. Business Edge Course Titled Communicating Effectively** by International Finance Cooperation, World Bank Group, Lahore; August 20–21, 2014.

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## Courses Taught at University of the Punjab

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

## 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 "1<sup>st</sup> National Conference on Mathematical Sciences" at University of Malakand, Khyber Pakhtukhwa-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 "1<sup>st</sup> 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 "14<sup>th</sup> 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 "1<sup>st</sup> UMT International Conference on Pure and Applied Sciences" at University of Management and Technology, Lahore, Pakistan during March 05-07, 2016.
- **Energy Density Irregularities in Self-gravitating Systems (POSTER)** in an International Conference named "21<sup>st</sup> 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 “2<sup>nd</sup> International UMT Conference on Pure and Applied Sciences” at UMT, Lahore, Pakistan during October 05-07, 2017.
- **A Study Based on Dynamical Variables and Self-Gravitating Objects** in an International Conference named “6<sup>th</sup> 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 “4<sup>th</sup> International UMT Conference on Pure and Applied Mathematics (4<sup>th</sup> 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 “XI<sup>th</sup> 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.

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## 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.

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## 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 14<sup>th</sup> Regional Conference; World Scientific**).

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## List of Journal Publications (Indexed by ISI-JCR)

1. M. Sharif and **M.Z. Bhatti**: *Structure Scalars for Charged Cylindrically Symmetric Relativistic Fluids*, Gen. Relativ. Gravit. **44**(2012)2811 (**Springer**).
2. M. Sharif and **M.Z. Bhatti**: *Structure Scalars in Charged Plane Symmetry*, Mod. Phys. Lett. A **27**(2012)1250141 (**World Scientific**).
3. M. Sharif and **M.Z. Bhatti**: *Gravitational Binding Energy in Charged Cylindrical Symmetry*, Can. J. Phys. **90**(2012)1233 (**NRS Research Press**).
4. M. Sharif and **M.Z. Bhatti**: *Effects of Electromagnetic Field on Shearfree Spherical Collapse*, Astrophys. Space. Sci. **347**(2013)337 (**Springer**).
5. M. Sharif and **M.Z. Bhatti**: *Stability of the Expansion-free Charged Cylinder*, J. Cosmol. Astropart. Phys. **10**(2013)056 (**IOP, UK**).
6. M. Sharif and **M.Z. Bhatti**: *Stability Analysis of Restricted Non-Static Axial-Symmetry*, J. Cosmol. Astropart. Phys. **11**(2013)014 (**IOP, UK**).
7. M. Sharif and **M.Z. Bhatti**: *Charged Static Axial Symmetric Solutions and Scalar Structures*, Astrophys. Space. Sci. **349**(2014)995 (**Springer**).
8. M. Sharif and **M.Z. Bhatti**: *Stability of the Charged Radiating Cylinder*, Phys. Lett. A **378**(2014)469 (**Elsevier**).
9. M. Sharif and **M.Z. Bhatti**: *On the Stability of a Class of Radiating Viscous Self-Gravitating Stars with Axial Symmetry*, Astropart. Phys. **56**(2014)35 (**Elsevier**).
10. M. Sharif and **M.Z. Bhatti**: *Shearfree and Cavity Models with Plane Symmetry*, Astrophys. Space Sci. **352**(2014)883 (**Springer**).
11. M. Sharif and **M.Z. Bhatti**: *Radiating Collapsing Relativistic Models*, Phys. Scr. **89**(2014)084004 (**IOP, UK**).
12. M. Sharif and **M.Z. Bhatti**: *Effects of Some Physical Factors on the Inhomogeneity in Planar Symmetry*, Mod. Phys. Lett. A **29**(2014)1450094 (**World Scientific**).
13. M. Sharif and **M.Z. Bhatti**: *Electromagnetic Effects on the Inhomogeneity of Planar Symmetry*, Mod. Phys. Lett. A **29**(2014) 1450129 (**World Scientific**).
14. M. Sharif and **M.Z. Bhatti**: *Effects of Some Physical Factors on the Stability of Collapsing Stars*, Int. J. Mod. Phys. D **23**(2014)1450085 (**World Scientific**).
15. M. Sharif and **M.Z. Bhatti**: *Dynamics and Stability of Charged Spherical Star with Tilted and Non-Tilted Congruences*, Mod. Phys. Lett. A **29**(2014)1450165 (**World Scientific**).



16. M. Sharif and **M.Z. Bhatti**: *Stability Analysis of Expansion-free Charged Planar Geometry*, *Astrophys. Space Sci.* **355**(2015)289 (**Springer**).
17. M. Sharif and **M.Z. Bhatti**: *Structure Scalars and Super-Poynting Vector of Tilted Szekeres Geometry*, *Int. J. Mod. Phys. D* **24**(2015)1550014 (**World Scientific**).
18. M. Sharif and **M.Z. Bhatti**: *Dynamics of Charged Planar Geometry in Tilted and Non-Tilted Frames*, *J. Exp. Theor. Phys.* **120**(2015)813 (**Springer**).
19. M. Sharif and **M.Z. Bhatti**: *Role of Bulk Viscosity and Electromagnetic Field on the Stability of Collapsing Cylinder*, *Int. J. Theor. Phys.* **54**(2015)2921 (**Springer**).
20. M. Sharif and **M.Z. Bhatti**: *Stability Analysis of Axial Reflection Symmetric Spacetime*, *Mon. Not. R. Astron. Soc.* **455**(2016)1015 (**Oxford University Press**).
21. Z. Yousaf and **M.Z. Bhatti**: *Electromagnetic Field and Cylindrical Compact Objects in Modified Gravity*, *Mon. Not. R. Astron. Soc.* **458**(2016)1785 (**Oxford University Press**).
22. Z. Yousaf, K. Bamba and **M.Z. Bhatti**: *Influence of Modification of Gravity on the Dynamics of Radiating Spherical Fluids*, *Phys. Rev. D* **93**(2016)064059 (**American Physical Society**).
23. **M.Z. Bhatti** and Z. Yousaf: *Influence of Electric Charge and Modified Gravity on Density Irregularities*, *Eur. Phys. J. C* **76**(2016)219 (**Springer**).
24. Z. Yousaf and **M.Z. Bhatti**: *Cavity Evolution and Instability Constraints of Relativistic Interiors*, *Eur. Phys. J. C* **76**(2016)267 (**Springer**).
25. M. Sharif and **M.Z. Bhatti**: *Binding Energy in Self-gravitating Charged Plane Symmetric Systems*, *Chin. J. Phys.* **54**(2016)451 (**Elsevier**).
26. Z. Yousaf, K. Bamba and **M.Z. Bhatti**: *Causes of Irregular Energy Density in  $f(R,T)$  Gravity*, *Phys. Rev. D* **93**(2016)124048 (**American Physical Society**).
27. **M.Z. Bhatti**, *Shear-Free Stellar Solutions in  $\Lambda$ -Dominated Era*, *Eur. Phys. J. Plus* **131**(2016)428 (**Springer**).
28. **M.Z. Bhatti** and Z. Yousaf: *Dynamical Variables and Evolution of the Universe*, *Int. J. Mod. Phys. D* **26**(2017)1750029 (**World Scientific**).
29. **M.Z. Bhatti** and Z. Yousaf: *Gravitational Collapse and Dark Universe with LTB Geometry*, *Int. J. Mod. Phys. D* **26**(2017)1750045 (**World Scientific**).
30. Z. Yousaf, **M.Z. Bhatti** and Ume Farwa: *Stability of Compact Stars in  $\alpha R^2 + \beta(R_{\nu\delta} T^{\nu\delta})$  Gravity*, *Mon. Not. R. Astron. Soc.* **464**(2017)4509 (**Oxford University Press**).
31. Z. Yousaf, K. Bamba and **M.Z. Bhatti**: *Role of Tilted Congruence and  $f(R)$  Gravity on Regular Compact Objects*, *Phys. Rev. D* **95**(2017)024024 (**American Physical Society**).
32. **M.Z. Bhatti**, Z. Yousaf and Sonia Hanif: *Stability of Anisotropic Compact Objects in  $f(T)$  Gravity*, *Mod. Phys. Lett. A* **32**(2017)1750042 (**World Scientific**).
33. Z. Yousaf, **M.Z. Bhatti** and Aamna Rafaqat: *LTB Geometry with Tilted and Non-Tilted Congruences in  $f(R,T)$  Gravity*, *Int. J. Mod. Phys. D* **26**(2017)1750099 (**World Scientific**).



34. Z. Yousaf, **M.Z. Bhatti** and Aamna Razaqat: *Electromagnetic Effects on the Evolution of LTB Geometry in Modified Gravity*, *Astrophys. Space Sci.* **362**(2017)68 (**Springer**).
35. **M.Z. Bhatti**, Z. Yousaf and Sonia Hanif: *Role of  $f(T)$  Gravity on the Evolution of Collapsing Stellar Model*, *Phys. Dark Universe* **16**(2017)34 (**Elsevier**).
36. **M.Z. Bhatti**, Z. Yousaf and Sonia Hanif: *Gravitational Collapse in Generalized Teleparallel Gravity*, *Eur. Phys. J. Plus* **132**(2017)230 (**Springer**).
37. Z. Yousaf, M. Ilyas and **M.Z. Bhatti**: *Static Spherical Wormhole Models in  $f(R, T)$  Gravity*, *Eur. Phys. J. Plus* **132**(2017)268 (**Springer**).
38. **M.Z. Bhatti**, A. Aslam and S. Ashraf: *Construction of Thin-Shell Wormholes from Metric  $f(R)$  Gravity*, *Mod. Phys. Lett. A* **32**(2017)1750111 (**World Scientific**).
39. Z. Yousaf, **M.Z. Bhatti** and Ume Farwa: *Role of  $f(R, T, R_{\nu\delta} T^{\nu\delta})$  Model on the Stability of Cylindrical Stellar Model*, *Eur. Phys. J. C* **77**(2017)359 (**Springer**).
40. Z. Yousaf, **M.Z. Bhatti** and Ume Farwa: *Stability Analysis of Stellar Radiating Filaments*, *Class. Quantum Grav.* **34**(2017)145002 (**IOP, UK**).
41. Z. Yousaf, **M.Z. Bhatti** and Aamna Razaqat: *Evolution of Inhomogeneous LTB Geometry with Tilted Congruence and Modified Gravity*, *Can. J. Phys.* **95**(2017)1246 (**NRS Research Press**).
42. **M.Z. Bhatti**, Z. Yousaf and Sara Ashraf: *Charged Black String Thin-Shell Wormholes in Modified Gravity*, *Ann. Phys.* **383**(2017)439 (**Elsevier**).
43. K. Bamba, M. Ilyas, **M.Z. Bhatti** and Z. Yousaf: *Energy Conditions in Modified  $f(G)$  Gravity*, *Gen. Relativ. Gravit.* **49**(2017)112 (**Springer**).
44. Z. Yousaf, M. Ilyas and **M.Z. Bhatti**: *Influence of Modification of Gravity on Spherical Wormhole Models*, *Mod. Phys. Lett. A* **32**(2017)1750163 (**World Scientific**).
45. **M.Z. Bhatti**, Z. Yousaf and M. Ilyas: *Evolution of Compact Stars and Dark Dynamical Variables*, *Eur. Phys. J. C.* **77**(2017)690 (**Springer**).
46. Z. Yousaf, M. Sharif, M. Ilyas and **M.Z. Bhatti**: *Influence of  $f(R)$  Models on the Existence of Anisotropic Self-Gravitating Systems*, *Eur. Phys. J. C.* **77**(2017)691 (**Springer**).
47. **M.Z. Bhatti** and Z. Yousaf: *Stability of Anisotropic Stellar Filaments*, *Ann. Phys.* **387**(2017)253 (**Elsevier**).
48. M. Ilyas, Z. Yousaf, **M.Z. Bhatti** and B. Masud: *Existence of Relativistic Structures in  $f(R, T)$  Gravity*, *Astrophys. Space Sci.* **362**(2017)237 (**Springer**).
49. **M.Z. Bhatti**, M. Sharif, Z. Yousaf and M. Ilyas: *Role of  $f(G, T)$  Gravity on the Evolution of Relativistic Stars*, *Int. J. Mod. Phys. D* **27**(2018)1850044 (**World Scientific**).
50. Z. Yousaf, **M.Z. Bhatti** and M. Ilyas: *Existence of Compact Structures in  $f(R, T)$  Gravity*, *Eur. Phys. J. C* **78**(2018)307 (**Springer**).
51. Z. Yousaf, M. Sharif, M. Ilyas and **M.Z. Bhatti**: *Energy Conditions in Higher Derivative  $f(R, \square R, T)$  Gravity*, *Int. J. Geom. Meth. Mod. Phys.* **15**(2018)1850146 (**World Scientific**).

52. Z. Yousaf and **M.Z. Bhatti**: *Some Anisotropic Planar Stellar Models*, Int. J. Geom. Meth. Mod. Phys. **15**(2018)1850160 (**World Scientific**).
53. 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*, Eur. Phys. J. A **54**(2018)122 (**Springer**).
54. **M.Z. Bhatti**: *Stability of Celestial Objects and Adiabatic Index*, Eur. Phys. J. Plus **133**(2018)431 (**Springer**).
55. **M.Z. Bhatti**, Z. Yousaf and M. Ilyas: *Existence of Wormhole Solutions and Energy Conditions in  $f(R, T)$  Gravity*, J. Astrophys. Astron., **39**(2018)69 (**Springer**).
56. **M.Z. Bhatti**, Z. Yousaf and A. Yousaf: *Tolman Mass of Spherical Fluids with Electromagnetic Field*, Mod. Phys. Lett. A **34**(2019)1950012 (**World Scientific**).

## Worked as a Reviewer for Journals

Modern Physics Letters A;  
 International Journal of Theoretical Physics;  
 Canadian Journal of Physics;  
 Open Astronomy;  
 Mediterranean Journal of Physics;  
 Applications and Applied Mathematics: An International Journal.

## Countries Visited

**United States of America:** To attend 21<sup>st</sup> 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 XII<sup>th</sup> Spontaneous Workshop on Cosmology « Hot Topics in Modern Cosmology » during May 2018 for ten days.

## Supervised MPhil Thesis Titles

1. *Role of  $f(T)$  Gravity on the Perturbative Analysis of Compact Objects* by **Sonia Hanif** (2017).

## MPhil in Progress

2017-19	Mr. Muhammad Ajmal	(in progress)
2017-19	Miss Zarnoor	(in progress)
2017-19	Miss Mubeen Nawaz	(in progress)