

# Dr. Zeeshan Yousaf

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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- [zeeshan.math@pu.edu.pk](mailto:zeeshan.math@pu.edu.pk).
- Nationality Pakistani.
- Weblinks <http://pu.edu.pk/faculty/description/1641/Dr-Zeeshan-Yousaf.html>  
<http://pu.edu.pk/ggc/GroupMembers.html>

### Education

- 2012-2015 **Ph.D. (Doctor of Philosophy)** in Modified Gravitational Theory, Department of Mathematics, University of the Punjab, Lahore.  
Thesis: Dynamical Evolution of Collapsing Stellar Systems in  $f(R)$  Gravity
- 2010-2012 **M.Phil. (Master of Philosophy)** in Applied Mathematics, University of the Punjab, Pakistan.  
Department of Mathematics, University of the Punjab, Lahore.  
CGPA=3.87/4.00.  
Thesis: Shear and Expansion Free Evolution Models in General Relativity
- 2007-2009 **M.Sc. (Master of Science)** in Applied Mathematics, Department of Mathematics, University of the Punjab, Lahore.  
CGPA=3.86/4.00

### Awards, Scholarships and Honors

- 2015 **Research Productivity Award in Category A**, Pakistan Council for Science and Technology, Islamabad-Pakistan.
- 2014, 2015 **Maximum Research Incentive Award**, University of the Punjab, Lahore-Pakistan.
- 2014, 2016 **Research Productivity Award in Category B**, Pakistan Council for Science and Technology, Islamabad-Pakistan.
- 2012-2014 **Indigenous Ph.D. Fellowship**, Higher Education Commission, Pakistan.
- 2011-2012 **DPC M.Phil. Merit Scholarship**, Department of Mathematics, University of the Punjab, Pakistan.

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## Practical Exposure

1. **Lecturer**, Department of Mathematics, University of the Punjab, Lahore. May, 2014 – Nov., 2015.
2. **Assistant Professor**, Department of Mathematics, University of the Punjab, Lahore. Nov., 2015 – present.
3. **Assistant Superintendent**, Maulana Muhammad Ali Johar Hall, University of the Punjab, Lahore. May, 2014 – Nov., 2016.
4. **Assistant Superintendent**, Allama Iqbal Hall, University of the Punjab, Lahore. Nov., 2016 – present.

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## Administrative Experiences

1. **Member** of Departmental Admission Committee, Department of Mathematics, University of the Punjab, Lahore (2014, 2015, 2016, 2017).
2. **Incharge**, General Accounts taking of Department of Mathematics, University of the Punjab, Lahore (2014 and 2016).
3. **Associate Secretary**, International Conference on Relativistic Astrophysics, University of the Punjab, Lahore (2015).
4. **Incharge**, Accounts and Stock taking of Departmental Computer Center, Department of Mathematics, University of the Punjab, 2015.
5. **Organizer**, One Day Conference on Gravitation and Cosmology, University of the Punjab, Lahore (2015).
6. **Coordinator**, Computer Center, Department of Mathematics, University of the Punjab, Lahore (Sept., 2015 – May, 2016).
7. **Expert**, Self-Assessment Report, Master of Science in Mathematics, National Textile University, Faisalabad (2017).
8. **Coordinator**, Departmental Seminar Series, Department of Mathematics, University of the Punjab, Lahore (Nov. 2017–present)

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## Trainings

1. **Faculty Orientation Program** by Institute of Administration 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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## MS/MPhil Theses Supervised

- 2015-2017 Aamna Razaqat  
**Thesis Title:** The Study of LTB Geometry with Tilted and Non-Tilted Congruences in Modified Gravity
- 2015-2017 Ume Farwa  
**Thesis Title:** Spherical and Cylindrical Stellar Collapse in  $f(R, T, R_{\mu\nu} T^{\mu\nu})$  Gravity

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## Memberships

1. Faculty member, **The Group of Gravitation and Cosmology**, Lahore–Pakistan.
2. Life time member, **Pakistan Physical Society**, Islamabad–Pakistan.

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## Academic and Research Interests

Cosmology,  
Electromagnetic Field Theory,  
Geometry, Special & General Relativity,  
Modified Gravitational theories,  
Mathematical Techniques,  
Newtonian Dynamics  
Relativistic Astrophysics.

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## MS/MSc/BS Courses Taught

Analytical Dynamics  
Computer (Introduction and Applications)-COMP-111  
Geometry  
Linear Algebra  
Partial Differential Equations  
Quantum Mechanics  
Real Analysis  
Numerical Analysis  
Special Theory of Relativity  
Vectors and Tensor Analysis

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## Referee for the Evaluation of Dissertation/Project

1. Mr. Ahmad Munir  
Session: 2012-2016, Roll No. 572-BH-MATH-12  
**Thesis Title:** FRW Model of the Expanding Universe (BS)  
Affiliation: Government College University, Lahore
2. Ms. Maham Lodhi  
Session: 2012-2016, Roll No. 561-BH-MATH-12  
**Thesis Title:** On the Schwarzschild Black Hole (BS)  
Affiliation: Government College University, Lahore
3. Ms. Sidra Nasir  
Session: 2012-2016, Roll No.: 1254-BH-MATH-12  
**Thesis Title:** Cosmic Behavior via Physical Parameters (BS)  
Affiliation: Government College University, Lahore
4. Mr. Riasat Ali  
Session: 2014-2016, Roll No. MPHILMATH-F14-E20  
**Thesis Title:** The Phenomenon of Charged Vector Particle Tunneling (MS)  
Affiliation: University of Education, Lahore
5. Ms. Arooj Fatima  
Session: 2015-2017, Roll No.: MPHILMATH-F13-E21  
**Thesis Title:** Quantum Corrections for Charged Regular Black Holes (MS)  
Affiliation: University of Education, Lahore
6. Mr. Jahazaib Hassan  
Session: 2013-2017, Roll No.: 0568-BH-MATH-13  
**Thesis Title:** Study of the Behavior of Inflationary Model through Perturbed Parameters (BS)  
Affiliation: Government College University, Lahore

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## Computer and Software Skills

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

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## Talks Delivered

1. **Some Exact Models of Relativity** at Department of Mathematics, University of the Punjab, Lahore; May 30, 2012.

2. **Electromagnetic Effects on the Stability of Spherical Relativistic Collapse in  $f(R)$  Gravity** at Department of Mathematics, University of the Punjab, Lahore; November 6, 2013.
3. **Stability of Charged Spherical Dissipative Collapse in  $f(R)$  Gravity** as a poster presentation in an international conference named “Symmetries, Differential Equations and Applications II” at School of Natural Sciences, NUST, Islamabad; January 27–30, 2014.
4. **Energy Density Inhomogeneities with Polynomial  $f(R)$  Cosmology** at Department of Mathematics, University of the Punjab, Lahore; October 29, 2014.
5. **Dynamical Instability of Charged Spherical Radiating Collapse in  $f(R)$  Gravity** at 1<sup>st</sup> National Conference on Mathematical Sciences, University of Malakand, Khyber Pakhtunkhwa; September 02–04, 2014.
6. **Dynamical Instability of Relativistic Fluids in  $f(R)$  Gravity** at International Conference on Relativistic Astrophysics by Department of Mathematics, University of the Punjab, Lahore; February 10–14, 2015.
7. **A Bird’s Eye of  $f(R)$  Gravity** at Department of Mathematics, University of the Punjab, Lahore; February 25, 2015.
8. **Energy Density Irregularities in  $f(R)$  Gravity** at 1<sup>st</sup> UMT National Conference on Pure and Applied Mathematics, University of Management Technology, Lahore; March 07–08, 2015.
9. **Causes of Inhomogeneous Energy Density in Relativistic Fluids with  $f(R)$  Background** at 14<sup>th</sup> Regional Conference on Mathematical Physics, Department of Mathematics, Quaid-i-Azam University, Islamabad; November 09–14, 2015.
10. **Compact Stars and their Evolution** at International Conference on Recent Advances in Applied Mathematics, Department of Mathematics, COMSATS Institute of Information Technology, Lahore; December 17–18, 2015.
11. **Unstable Phases of Collapsing Models** at 1<sup>st</sup> UMT International Conference in Pure and Applied Science, Centre for Mathematics and its Applications, University of Management Technology, Lahore; March 05–07, 2016.
12. **Dynamical Instability and Cavity Evolution** at 21<sup>st</sup> International Conference on General Relativity and Gravitation (GR21), Columbia Astrophysics Laboratory, Columbia University, New York–USA; July 10–15, 2016.

13. **An Overview on Cosmic Evolution** (*invited speaker*) at Research Seminar Program, UMT, Sialkot–Pakistan; Dec. 03, 2016.
14. **Differential Geometry, Vectors and Tensors** (*resource person*) at one day workshop organized by Higher Education Department, Punjab at Govt. Post Graduate College for Women, Gujranwala–Pakistan; Dec. 10, 2016.
15. **The Quest of Cosmic and Stellar Evolution** (*invited speaker*) at Bi-Monthly Seminar Series, UMT, Lahore–Pakistan; Dec. 15, 2016.
16. **Causes of Inhomogeneous Energy Density in Modified Gravity** at Southern Cross 2017: Surveying the Cosmos, The Science From Massively Multiplexed Surveys at Australian Astronomical Observatory, Sydney–Australia; June 06, 2017.
17. **Stellar Zoo, Past and Future** at 2<sup>nd</sup> UMT International Conference on Pure and Applied Sciences, UMT, Lahore–Pakistan; Oct. 05, 2017.
18. **Challenges: Our Understanding of the Universe** at 2017 International Conference on Mathematics and its Applications, Government College University Lahore–Pakistan; Nov. 14, 2017.

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## Conference Proceedings

- 2015 M. Sharif and Z. Yousaf: *Dynamical Instability Of Relativistic Fluids in  $f(R)$  Gravity*, Proc. Int. Conf. Relativ. Astrophys (2015)202.
- 2016 M. Sharif and Z. Yousaf: *Causes of Inhomogeneous Energy Density in Relativistic Fluids with  $f(R)$  Background*, Proc. 14<sup>th</sup> Reg. Conf. Math. Phys. To appear.

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## Workshops, Conferences and Seminars

- 2010–Present **Weekly Departmental Seminar Series** in Department of Mathematics, PU, Lahore–Pakistan.
- Oct., 2010 **Lecture Series on Black Holes**, PU, Lahore–Pakistan.
- Nov., 2010 **Lecture Series on Cosmology**, PU, Lahore–Pakistan.
- Feb., 2011 **5<sup>th</sup> World Conference on 21<sup>st</sup> Century Mathematics**, ASSMS, Lahore–Pakistan.
- Nov., 2011 **NUST Conference on Mathematical Sciences**, NUST, Islamabad–Pakistan.
- Dec., 2011 **One Day Conference on Gravitation**, PU, Lahore–Pakistan.
- Feb., 2013 **IV Italian-Pakistani Workshop on Relativistic Astrophysics**, NUST, Islamabad–Pakistan.
- March, 2013 **6<sup>th</sup> World Conference on 21<sup>st</sup> Century Mathematics**, ASSMS, Pakistan.

- Nov., 2013 **Lecture Series on Cosmology**, PU, Lahore–Pakistan.
- Jan., 2014 **Symmetries, Differential Equations and Applications II**, NUST, Pakistan.
- Sept., 2014 **1<sup>st</sup> National Conference on Mathematical Sciences**, UoM, Malakand–Pakistan; Sept. 05-09, 2017.
- Feb., 2015 **International Conference on Relativistic Astrophysics**, PU, Lahore–Pakistan
- March, 2015 **1<sup>st</sup> UMT National Conference on Pure and Applied Mathematics**, UMT, Lahore–Pakistan.
- Nov., 2015 **14<sup>th</sup> Regional Conference on Mathematical Physics**, QAU, Islamabad–Pakistan.
- Dec., 2015 **International Conference on Recent Advances in Applied Mathematics**, Department of Mathematics, COMSATS Institute of Information Technology, Lahore–Pakistan.
- March, 2016 **1<sup>st</sup> UMT International Conference in Pure and Applied Science**, Centre for Mathematics and its Applications, University of Management Technology, Lahore–Pakistan;
- July, 2016 **21<sup>st</sup> International Conference on General Relativity and Gravitation (GR21)**, Columbia Astrophysics Laboratory, Columbia University, New York-USA.
- Nov., 2016 **One Day conference on Gravitation and Cosmology**, PU, Lahore-Pakistan.26
- Dec, 2016 **Research Seminar Program**, University of Management and Technology, Sialkot–Pakistan.
- Dec, 2016 **One Day Workshop on Differential Geometry, Vectors and Tensors (Resource Person)**, Govt. Post Graduate College for Women, Gujranwala–Pakistan.
- Dec, 2016 **Bi-Monthly Seminar Series**, University of Management and Technology, Lahore–Pakistan
- June, 2017 **Southern Cross 2017: Surveying the Cosmos, The Science From Massively Multiplexed Surveys** at Australian Astronomical Observatory, Sydney–Australia; June 05-09, 2017.
- Oct., 2017 **2<sup>nd</sup> UMT International Conference on Pure and Applied Sciences**, at University of Management and Technology, Lahore–Pakistan; Oct. 05–07, 2017.
- Nov., 2017 **2017 International Conference on Mathematics and its Applications**, Government College University Lahore–Pakistan; Nov. 13-15, 2017.

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

- 2012 M. Sharif and **Z. Yousof**: *Shear-free Spherically Symmetric Fluid Models*, Chin. Phys. Lett. **29**, 050403 (2012).
- 2012 M. Sharif and **Z. Yousof**: *Expansion-free Cylindrically Symmetric Models*, Can. J. Phys. **90**, 865 (2012).
- 2012 M. Sharif and **Z. Yousof**: *Evolution of Expansion-free Self-Gravitating Fluids and Plane Symmetry*,

Int. J. Mod. Phys. **21**, 1250095 (2012).

- 2013 M. Sharif and **Z. Yousaf**: *Electromagnetic Field and Dynamical Instability Of Cylindrical Collapse in  $f(R)$  Gravity*,  
Mon. Not. R. Astron. Soc. **432**, 264 (2013).
- 2013 M. Sharif and **Z. Yousaf**: *Dynamical Instability of Charged Expansion-free Spherical Collapse in  $f(R)$  Gravity*,  
Phys. Rev. D **88**, 024020 (2013).
- 2013 M. Sharif and **Z. Yousaf**: *Stability of the Charged Spherical Dissipative Collapse in  $f(R)$  Gravity*,  
Mon. Not. R. Astron. Soc. **434**, 2529 (2013).
- 2013 M. Sharif and **Z. Yousaf**: *Effects of CDTT Model on the Spherical Collapse in Palatini  $f(R)$  Gravity*,  
Eur. Phys. J. C **73**, 2633 (2013).
- 2014 M. Sharif and **Z. Yousaf**: *Cylindrical Thin-shell Wormholes in  $f(R)$  Gravity*,  
Astrophys. Space Sci. **351**, 351 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Electromagnetic Field and Dynamical Instability Of Collapse with CDTT Model*,  
Astropart. Phys. **56**, 19 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Energy Density Inhomogeneities with Polynomial  $f(R)$  Cosmology*,  
Astrophys. Space Sci. **352**, 321 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Stability Analysis of Cylindrically Symmetric Self-Gravitating Systems in  $R + \epsilon R^2$  Gravity*,  
Mon. Not. R. Astron. Soc. **440**, 3479 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Stability of a Class of Non-Static Axial Self-Gravitating Systems in  $f(R)$  Gravity*,  
Astrophys. Space Sci. **352**, 943 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Instability of Dissipative Restricted Non-Static Axial Collapse with Shear Viscosity in  $f(R)$  Gravity*,  
J. Cosmol. Astropart. Phys. **06**, 019 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Energy Density Inhomogeneities in Charged Radiating Stars with Generalized CDTT Model*,  
Astrophys. Space Sci. **354**, 431 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Dynamical Analysis of Self-Gravitating Stars in  $f(R, T)$  Gravity*,  
Astrophys. Space Sci. **354**, 471 (2014).
- 2014 M. Sharif and **Z. Yousaf**: *Dynamical Analysis of Radiating Spherical Collapse in*



- Palatini  $f(R)$  Gravity*,  
Astrophys. Space Sci. **354**, 481 (2014).
- 2015 M. Sharif and **Z. Yousaf**: *Role of Adiabatic Index on the Evolution of Spherical Gravitational Collapse in Palatini  $f(R)$  Gravity*,  
Astrophys. Space Sci. **355**, 317 (2015).
- 2015 M. Sharif and **Z. Yousaf**: *Dynamics of Spherical Stars with Structure Scalars and  $R + \epsilon R^n$  Cosmology*,  
Can. J. Phys. **93**, 905 (2015).
- 2015 M. Sharif and **Z. Yousaf**: *Stability of Regular Energy Density in Palatini  $f(R)$  Gravity*,  
Eur. Phys. J. C, **75**, 58 (2015).
- 2015 M. Sharif and **Z. Yousaf**: *Dynamics of Relativistic Fluids with Structure Scalars and  $\epsilon R^2$  Cosmology*,  
Gen. Relativ. Gravit. **47**, 48 (2015).
- 2015 M. Sharif and **Z. Yousaf**: *Radiating Cylindrical Gravitational Collapse with Structure Scalars in  $f(R)$  Gravity*,  
Astrophys. Space Sci. **357**, 49 (2015).
- 2015 M. Sharif and **Z. Yousaf**: *Instability of Meridional Axial System in  $f(R)$  Gravity*,  
Eur. Phys. J. C, **75**, 194 (2015).
- 2016 M. Sharif and **Z. Yousaf**: *Charged Adiabatic LTB Gravitational Collapse in  $f(R)$  Gravity*,  
Int. J. Theor. Phys. **55**, 470 (2016).
- 2016 **Z. Yousaf**, and M.Z. Bhatti: *Electromagnetic Field and Cylindrical Compact Objects in Modified Gravity*,  
Mon. Not. R. Astron. Soc. **458**, 1785 (2016).
- 2016 **Z. Yousaf**, K. Bamba and M.Z. Bhatti: *Influence of Modification of Gravity on the Dynamics of Radiating Spherical Fluids*,  
Phys. Rev. D **93**, 064059 (2016).
- 2016 M.Z. Bhatti and **Z. Yousaf**: *Influence of Electric Charge and Modified Gravity on Density Irregularities*,  
Eur. Phys. J. C **76**, 219 (2016).
- 2016 **Z. Yousaf** and M.Z. Bhatti: *Cavity Evolution and Instability Constraints of Relativistic Interiors*,  
Eur. Phys. J. C **76**, 267 (2016).
- 2016 **Z. Yousaf**, K. Bamba and M.Z. Bhatti: *Causes of Irregular Energy Density in  $f(R, T)$  Gravity*,  
Phys. Rev. D **93**, 124048 (2016).
- 2017 M.Z. Bhatti and **Z. Yousaf**: *Dynamical Variables and Evolution of the Universe*,  
Int. J. Mod. Phys. **26**, 1750029 (2017).

- 2017 M. Z. Bhatti and **Z. Yousaf**: *Gravitational Collapse and Dark Universe with LTB Geometry*,  
Int. J. Mod. Phys. **26**, 1750045 (2017).
- 2017 **Z. Yousaf**, M.Z. Bhatti and Ume Farwa: *Stability of Compact Stars in  $\alpha R^2 + \beta(R_{,\delta} T^{,\delta})$  Gravity*,  
Mon. Not. R. Astron. Soc. **464**, 4509 (2017).
- 2017 **Z. Yousaf**, K. Bamba and M.Z. Bhatti: *Role of Tilted Congruence and  $f(R)$  Gravity On Regular Compact Objects*,  
Phys. Rev. D **95**, 024024 (2017).
- 2017 **Z. Yousaf**: *Relativistic Vacuum Core Models in a  $\Lambda$ -Dominated Era*,  
Eur. Phys. J. Plus **132**, 71 (2017).
- 2017 M.Z. Bhatti, **Z. Yousaf** and S. Hanif: *Stability of Anisotropic Compact Objects in  $f(T)$  Gravity*,  
Mod. Phys. Lett. A **32**, 1750042 (2017).
- 2017 **Z. Yousaf**, M. Z. Bhatti and A. Razaqat: *LTB Geometry with Tilted and Non-Tilted Congruences in  $f(R, T)$  Gravity*,  
Int. J. Mod. Phys. D **32**, 1750099 (2017).
- 2017 **Z. Yousaf**, M. Z. Bhatti and A. Razaqat: *Electromagnetic effects on the Evolution of LTB Geometry in Modified Gravity*,  
Astrophys. Space Sci. **362**, 68 (2017).
- 2017 M. Z. Bhatti, **Z. Yousaf** and S. Hanif: *Role of  $f(T)$  Gravity on the Evolution of Collapsing Stellar Model*  
Phys. Dark Universe **16**, 34 (2017).
- 2017 M. Z. Bhatti, **Z. Yousaf** and S. Hanif: *Gravitational Collapse in Generalized Teleparallel Gravity*  
Eur. Phys. J. Plus **132**, 230 (2017).
- 2017 **Z. Yousaf**, M. Ilyas and M. Z. Bhatti: *Static Spherical Wormhole Models in  $f(R, T)$  Gravity*,  
Eur. Phys. J. Plus **132**, 268 (2017).
- 2017 **Z. Yousaf**: *Stellar Filaments with Minkowskian Core in Einstein- $\Lambda$  Gravity*,  
Eur. Phys. J. Plus **132**, 276 (2017).
- 2017 **Z. Yousaf**, M.Z. Bhatti and Ume Farwa: *Role of  $f(R, T, R_{,\delta} T^{,\delta})$  Gravity on the Stability of Cylindrical Stellar Model*,  
Eur. Phys. J. C **77**, 359 (2017).
- 2017 **Z. Yousaf**, M.Z. Bhatti and Ume Farwa: *Stability Analysis of Stellar Radiating Filaments*,  
Class. Quantum Grav. **34**, 145002 (2017).
- 2017 **Z. Yousaf**, M. Z. Bhatti and A. Razaqat: *Evolution of Inhomogeneous LTB Geometry with Tilted Congruences and Modified Gravity*,

- Can. J. Phys. **95**, 1246 (2017).
- 2017 M. Z. Bhatti, **Z. Yousaf** and S. Ashraf: *Charged Black String Thin-shell Wormholes in Modified Gravity*,  
Ann. Phys. **383**, 439 (2017).
- 2017 K. Bamba, M. Ilyas, M. Z. Bhatti and **Z. Yousaf**: *Energy Conditions in Modified  $f(G)$  Gravity*,  
Gen. Relativ. Gravit. **49**, 112 (2017).
- 2017 **Z. Yousaf**, M. Ilyas and M. Z. Bhatti: *Influence of Modification of Gravity on Spherical Wormhole Models*,  
Mod. Phys. Lett. A **32**, 1750163 (2017).
- 2017 M. Z. Bhatti, **Z. Yousaf**, M. Ilyas: *Evolution of Compact Stars and Dark Dynamical Variables*,  
Eur. Phys. J. C **690**, 77 (2017).
- 2017 **Z. Yousaf**, M. Sharif, M. Ilyas, M. Z. Bhatti. *Influence of  $f(R)$  Models on the Existence of Anisotropic Self-Gravitating Systems*,  
Eur. Phys. J. C **691**, 77 (2017).
- 2017 M. Z. Bhatti and **Z. Yousaf**; *Stability of Anisotropic Stellar Filaments*,  
Ann. Phys. **387**, 253 (2017).
- 2018 M. Ilyas, **Z. Yousaf**, M. Z. Bhatti and B. Masud: *Existence of Relativistic Structures in Modified Gravity*,  
Astrophys. Space Sci. **362**, 237 (2017).
- 2018 M. Z. Bhatti, M. Sharif, **Z. Yousaf** and M. Ilyas: *Role of Gravity on the Evolution of Relativistic Stars*,  
Int. J. Mod. Phys. D (to appear).