



Dr. Vipin Kumar Sharma (Ph.D.- Physics)
Specialization- Astrophysics and Cosmology

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👤 Associate of Committee on Space Research (COSPAR) 2022-27.

Ph.D.

University

Department of Physics, University of Lucknow, Lucknow, India.

Ph.D. thesis title

Dynamics and diagnostics of the modified gravity models.

Supervisor

***Prof. Murli Manohar Verma, University of Lucknow, Lucknow, India.**

Visiting Scientist

***Department of Theoretical Physics, CERN, 1211, Geneva 23, Switzerland.**

Associate member

***Inter University Center for Astronomy and Astrophysics (IUCAA), Pune, India.**

*Academic relationship/
Collaborators*

Prof. Varun Sahni (IUCAA), Prof. Marek Biesiada (National Centre for Nuclear Research, Poland), Prof. Maxim Khlopov (Universit'e de Paris, CNRS, Astroparticule et Cosmologie, France), Dr. Swagat Saurav Mishra (University of Nottingham, United Kingdom), Dr. Shankar Dayal Pathak (School of Physics, Shandong University, China), Dr. Manabendra Sharma, Centre for Theoretical Physics and Natural Philosophy, NAS, Mahidol University Thailand.

Experience in teaching

September 2022 - Present:

Assistant Professor (Guest) at Career Convent Girls Post Graduate College, University of Lucknow, Lucknow, India.

Lecture on courses: Advanced Physics (covering Special/General relativity, Thermodynamics, Classical mechanics, Electrodynamics, Nuclear Physics).

November 2021-September 2021:

Working as advanced Physics (covering Special/General relativity, Astrophysics, thermodynamics, classical mechanics, Cosmology) expert tutoring with Chegg India Pvt. Ltd.

March 2016 - Present:

Actively delivered a lecture/talk every Friday at the University of Lucknow, Lucknow, India. The lecture/talk is focused on the aspects of cosmology and alternative gravity theory. Also involved in co-mentoring Postgraduate students in their Masters' thesis at the University of Lucknow, India.

*Master's Thesis supervised
2021-2022*

Khalid Khan, University of Lucknow, Lucknow, India.

- **Thesis title: Study of scalar modes of GWs in modified gravity theory.**

2019-2020 Raghavendra Singh, University of Lucknow, Lucknow, India.
• Thesis title: Theoretical models for accelerated expansion of Universe.
• Roll number: 180014275007.

2019-2020 Prashant Saxena, University of Lucknow, Lucknow, India.
• Thesis title: Evidences of the accelerating Universe.
• Roll number: 180014275011.

October 2015 - February 2016: Physics teaching assistant at **J.N.V (Jawahar Navodaya Vidyalaya)** Kanpur Nagar (U.P.) -209402; Ministry Of Human Resource and Development (Department Of Education) Government Of India.

July 2013 - October 2014: Involved in learning, and practicing teacher's training skills under the B.Ed. degree course at CSJM Kanpur University, Kanpur, India.

April 2009 - November 2012: Working as a part-time tutor.

Academic records

2024 Refresher course on Astronomy and Astrophysics, **Inter-University Center for Astronomy and Astrophysics (IUCAA)**, Pune, India.

2023 PhD from Department of Physics, **University of Lucknow** (UoL), India.
• Specialization: Astrophysics/Cosmology/Modified gravity.

2023 Qualified Global Initiative for Academic Networks (GIAN) course on "**Gravitational Wave Astronomy**", conducted by Centre for Theoretical Physics (CTP), **Jamia Millia Islamia Central University**, New Delhi, India. (Grade B).

2017 Qualified Global Initiative for Academic Networks (GIAN) course on "**The Viability of theories beyond Einstein's general Relativity**", conducted by Centre for Theoretical Physics (CTP), **Jamia Millia Islamia Central University**, New Delhi, India. (Grade B).

2014 Bachelor of Education (B. Ed) from **CSJM Kanpur University**, Kanpur, India.
• Specialization: Science/Maths.

2013 Master of Science (Physics) from **University of Lucknow**, Lucknow, India.
• Specialization: X-rays.

2010 Bachelor of Science (Physics, Mathematics and Statistics) from **Lucknow Christian Degree College**, University of Lucknow, Lucknow, India.

2007 State Board Examination, Uttar Pradesh Board, India.
Subjects: Physics, Mathematics, Chemistry, English, Hindi.

2004 State Board Examination, Uttar Pradesh Board, India.
Subjects: Mathematics, Science, Social Science, English, Hindi, Computer.

Research interest

Cosmology beyond the LAMBDA Cold Dark Matter (CDM) model of General Relativity: Modified gravity and its variants at classical and quantum level, Local scale dynamics, Cosmic scale dynamics, Cosmic Inflation, Dark Energy, Dark Matter, Gravitational lensing of Light and Gravitational Waves (GWs) in modified gravity, Extraction of polarisation properties of GWs in modified gravity, Newmann-Penrose formalism and its possible modification for GW study, Light scalar fields, Higgs field and interactions.

List of Publications

- 2024 **Probing massive gravitons in $f(R)$ with lensed gravitational waves.**
• <https://arxiv.org/pdf/2310.10346.pdf>.
• Under review with Physics Letter B.
• Impact factor: 4.4
- 2023 **Effects on GW lensing due to the scalaron halo cloud around a gravitating system.**
• Under review with Classical and Quantum Gravity (CQG).
• Impact factor: 3.6
- 2022 **Unified $f(R)$ gravity at local scale.**
The European Physical Journal C, (2022) 82:400,
• <https://doi.org/10.1140/epjc/s10052-022-10329-6>.
• Impact factor: 4.8
- 2022 **Diagnostics for distinguishing massless and massive Gravitational Waves in the shifted background scalar curvature,**
• <https://app.cospar-assembly.org/2024/browser/presentation/32551>.
- 2021 **Light deflection angle through velocity profile of galaxies in $f(R)$ model.**
The European Physical Journal C, (2021) 81:109,
• <https://doi.org/10.1140/epjc/s10052-021-08908-0>
• Impact factor: 4.58
- 2020 **Extended galactic rotational velocity profiles in $f(R)$ gravity background.**
The European Physical Journal C, (2020) 80:619,
• <https://doi.org/10.1140/epjc/s10052-020-8186-1>
• Impact factor: 4.58
- 2019 **A new explanation of dark matter-plasma shift in bullet cluster by modification of gravity.**
• <https://easychair.org/publications/preprint/QBqp>
• Proceeding of International Conference on Plasma Science and Applications (ICPSA-2019).
- 2018 **Signature of Topology of the Universe.**
• <https://doi.org/10.29320/sjnpgrj.v2i01.11028>
• Revelation: A journal of popular Science, 2, No.1, 25-32.

A brief note:

I have attempted to present a thorough theoretical and observational investigation by addressing the precise deviations in Einstein's GR gravity theory and its conformal $f(R)$ analog at different scales. I have placed the most stringent constraints to date along with its diagnostic analysis.

Awards/Achievements/Lectures

- Award: 2023* Uddeepan best Research Paper Award, State University, Lucknow, India.
- Award: 2022* 44th Scientific Assembly of Committee on Space Research (COSPAR) International award, Athens, Greece.
- Award: 2022* ITS award for International travel by Science and Engineering Research board, Department of Science and Technology, New Delhi, India.
- Award: 2021* Uddeepan best Research Paper Award, State University, Lucknow, India.
- Lecture: 2019* Contributory talk delivered at "International Conference on Gravitation and Cosmology-2019", IISER Mohali, organized by Indian Association of General Relativity and Gravitation (IAGRG), India.
- Lecture: 2019* Contributory talk delivered at "12th International Conference on Plasma Science and Applications", University of Lucknow in association with Asian African Association for Plasma Training (AAAPT).
- Achievement: 2018* Qualified Professional State Teacher's Eligibility Test, India.
- Achievement: 2018* Selected for International Conference on "Recent trends in Cosmology" held at Banaras Hindu University, India.
- Achievement: 2018* Selected for "Gravitation and Gravitational Waves" workshop held at Assam University organised by Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune and DST-SERB, Government of India.
- Achievement: 2017* Qualified Lucknow University PhD Course work examination, India.
- Achievement: 2016* Selected for "Fundamental Problems in Quantum Physics" conference and workshop held at International Centre for Theoretical Sciences (ICTS), Bangalore, India.
- Achievement: 2014* Qualified Joint Admission test for M.Sc. and Integrated M.Sc.-Ph.D (JAM), jointly conducted by Six Indian Institute of Technology(s)- (IITs) and Indian Institute of Science (IISc.) on behalf of Ministry of Human Resource and Development, Government of India, in Physics.

National Cadet Corps (N.C.C): Qualified N.C.C. **AIR WING B** certificate in 2009.
the youth wing of the Indian
Armed Forces

Invited Talks

- April 23, 2023* Title of Talk: **Beyond Einstein Gravity theory: discussion of a few gravity theories and outlook for beyond.**
- [SPRING 2023 ONLINE LECTURE SERIES ON HIGH ENERGY PHYSICS AND HIGH ENERGY ASTROPHYSICS \(FIRST EDITION\)](#), Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee, United States.
- July 2021* Title of flash talk: **Study of galactic dynamics at very low cosmological redshift in modified gravity.**
- 'Cosmology from Home' international online conference, United Kingdom (C21-07-05.2).

December 2020 Title of talk: **Observational and theoretical perspectives in the modified Einstein's gravity theory.**

- [International Webinar-2020, Adventure with Black Holes: Unfolding the Noble Prize winning discoveries in Physics 2020, University of Lucknow, India.](#)

**List of conference
Talks/posters**

28 August- 02 September, 2023 Title of online poster presentation: **Characterizing Ultralight Scalarons in $f(R)$ gravity Using Gravitational Lensing of GWs.**

- [Cosmology 2023 in Miramare, SISSA, Trieste, Italy .](#)

23 April, 2023 Title of Talk: **Beyond Einstein Gravity theory- discussion of a few gravity theories and outlook for beyond.**

- [Spring 2023 Online Lecture Series On High Energy Physics And High Energy Astrophysics \(First Edition\), Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee, United States.](#)

March 2021 Title of talk: **Diagnostic signature for GWs scalar mode mass and dispersion relation in $f(R)$ background.**

- [National Seminar on Recent Advances in Astrophysics and Cosmology \(RAAC-2021\), University of North Bengal, India.](#)

November 2020 Title of talk: **Astrophysical observations and theoretical perspectives in the modified Einstein's gravity theory.**

- [The North Ecliptic Pole \(NEP\) Conference 2020, Multi-Wavelength Astronomy Collaboration towards the New Era with Deep Survey Data, organized by National Tsing Hua University \(NTHU\) cosmology group and the Institute of Astronomy and Astrophysics, Academia Sinica \(ASIAA\), Taiwan.](#)

August 2020 Title of talk: **Astrophysical constraints on modified gravity theories in the dusty galactic halos.**

- [International Conference on Dusty Astrophysics \(ICDA-2020\), Assam University, Silchar, India.](#)

October 2019 Title of talk: **Effects of modified $f(R)$ gravity in galactic rotation and lensing profiles.**

- [International Conference on Gravitation and Cosmology \(ICGC-2019\), IISER-Mohali, India.](#)

**Experience in science
popularization**

Popular Science Articles: "Signature of Topology of the Universe", Revelation: A journal of popular Science, 2, No.1 (2017) 25-32

- <https://doi.org/10.29320/sjnpgrj.v2i01.11028>

Popular Science Community
Work:

•Associate member of Committee on Space Research- COSPAR (**2022-Present**).

•At the Regional Science City Center, Lucknow, India- assisting the center by actively participating in various scientific programs organized during the festive occasions, that is to promote the spirit of scientific inquiry among students and common masses (**2017-Present**).

•Member of Vigyan Parishad, India (**2017-2023**).

•Member of Physics Society, University of Lucknow, India (**2019-Present**.)

•Member of Global Initiative of Academic Networks (GIAN), India (**2017-18**).

Public talk:

“Recent trends in sciences” on the occasion of celebrating National Science day (28 February 2023) at University of Lucknow, India.

Commission of trust

January 9, 2024 to January 9, 2027

American Journal of Modern Physics

Technical Skills/ Certificates

Certificate

Python Programming in Astrophysics, and Cosmology (2023).

Certificate

Matlab Programming (2018).

Operating system

DOS, Windows, Unix and Linux.

Office softwares

Microsoft Office (Microsoft Excel, Microsoft Projects), DocBook.

Scientific softwares

LaTeX, Mathematica, LAB Fit (Basics), Matlab (Basics).

Programming languages

HTML, C, C++ (Basics), Python.

PERSONAL Data

Strengths

- Strong and motivational; Ability to work individually as well as in a team; Positive attitude.

Languages

- English : Read, Write, Speak.
- Mother tongue: Hindi.

Nationality

- INDIAN.

D.O.B

- 24 November 1988.

Marital status

- Unmarried.

References

1. Emeritus Prof. Mario Novello, Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro, Brazil [email id:(i) mnovello42@gmail.com; (ii) novello@cbpf.br]
 - Thesis Examiner
2. Prof. Varun Sahni, Emeritus Professor, IUCAA, Post Bag 4, Pune University campus, Ganeshkhind, Pune 411007, India. [email id: varun@iucaa.in].
3. Prof. Marek Biesiada, National Centre for Nuclear Research, Pasteura 7, 02-093 Warsaw, Poland. [email id: Marek.Biesiada@ncbj.gov.pl].

4. Prof. Murli Manohar Verma, Department of Physics, University of Lucknow, Lucknow 226 007, India. [email id: murli.manohar.verma@cern.ch].

Declaration: It is declared that all the information given above is true to the best of my knowledge.



Apin K. Sharma