

## Vivek Baruah Thapa, Ph.D.

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### Address of Correspondence:

Department of Physics, Bhawanipur Anchalik College,  
Bhawanipur, Barpeta-781352,  
Assam, India

### Personal Profile

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Date of Birth: 25/10/1994    Marital status: Unmarried  
Nationality: Indian  
Gender: Male  
Hobbies: Swimming, Lawn Tennis, Travel

### Research Interests

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Dense matter, Equation of State, Gravitational Waves, Compact objects, Pulsars

### Employment History

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June 2023 – till date	<b>Assistant Professor-I</b> , Department of Physics, Bhawanipur Anchalik College, Assam, India
September 2022 – January 2023	<b>Doctoral Research Associate</b> , Department of Fizică Nuclear, Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH), Bucharest, România
September 2020 – August 2022	<b>Senior Research Fellow</b> , Department of Physics, Indian Institute of Technology Jodhpur, Rajasthan, India
August 2018 – August 2020	<b>Junior Research Fellow</b> , Department of Physics, Indian Institute of Technology Jodhpur, Rajasthan, India
May 2017 – July 2017	<b>Summer Research Fellow</b> , Indian Institute of Astrophysics, Bengaluru, Karnataka, India

### Education

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2018 – 2022    **Ph.D.**, Indian Institute of Technology Jodhpur, Rajasthan, India  
(CGPA - Course work: 9.5; % of marks: 95)  
Thesis title: *Probing dense matter equation of state in light of neutron star observable constraints.*  
Supervisor: Dr. Monika Sinha

## Education (continued)

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- 2016 – 2018 **M.Sc. Physics, specialization: Astrophysics**, Tezpur University, Assam, India  
(CGPA: 8.57; % of marks: 85.7)  
Thesis title: *Probing the diffuse infrared emission in the Small Magellanic Cloud.*  
Supervisor: Dr. Rupjyoti Gogoi
- 2013 – 2016 **B.Sc. Physics (Honours)**, Cotton University, Assam, India  
(CGPA: 9.0; % of marks: 90)
- 2011 – 2013 **Intermediate +2 (Science)**, Assam Higher Secondary Education Council, India  
(% of marks: 90)
- 2011 **Matriculation**, Secondary Education Board of Assam, India  
(% of marks: 85)

## Awards and Achievements

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- 2011 **Anundoram Boroah Merit Award**, Government of Assam
- 2013 **Alfarid Sazad Merit Award**, Government of Assam
- 2013 – 2018 **DST-INSPIRE Scholarship for Higher Education**, Department of Science & Technology, Government of India
- 2016 **Silver Medalist (First Class with Distinction)** in Bachelor's degree, Cotton University
- 2017 **Focus Area Science & Technology – Summer Fellowship [FAST-SF]**, Indian Academy of Sciences, Bengaluru, India
- 2018 **Silver Medalist (First Class with Distinction)** in Master's degree, Tezpur University
- 2018 – 2022 **MoE Doctoral Research Fellowship**, Government of India
- 2022 Selected for **National Postdoctoral Fellowship**, Science and Engineering Research Board, Government of India

## Skills

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- Languages Reading, writing and speaking competencies for English, Assamese, Hindi, Nepali
- Coding Python, Fortran, C++,  $\LaTeX$
- Misc. Academic research, teaching,  $\LaTeX$  typesetting

## Schools, Workshops & Conferences

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### Attended

- 2014 **Introductory Workshop on Relativistic Astrophysics**, Gauhati University, India
- 2014 & 2015 **Summer School on Radio Astronomy**, Cotton University, India
- 2016 **North-East Meet of Astronomers-2 (NEMA-2)**, Tezpur University, India
- 2017 **Winter School on Astronomy (Star Clusters)**, Western University, Canada & Birla Science Centre, Hyderabad, India
- ASTROSAT Data Analysis Workshop**, IUCAA & Tezpur University, India
- DST-SERB School on Observational Astronomy**, Tezpur University, India
- North-East Meet of Astronomers-3 (NEMA-3)**, Assam Don Bosco University, India
- 2019 **Introductory workshop in Astronomy and Astrophysics**, University of Kashmir (Leh campus), India

## Schools, Workshops & Conferences (continued)

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- 2020 **Virtual Meeting on Compact Stars and QCD**, ICTS-TIFR, Bengaluru, India. (online)  
**Michigan Cosmology Summer School**, University of Michigan, U.S.A. (online)  
**XXIV DAE-BRNS HEP Symposium**, NISER, Odisha, India. (online)
- 2021 **International Workshop on Emerging Trends in Gravitation and Cosmology**, Presidency University, Kolkata, India. (online)
- 2022 **School on Physics of the Early Universe**, ICTS-TIFR, Bengaluru, India.  
**21<sup>st</sup> National Space Science Symposium**, IISER-Kolkata, West Bengal, India. (online)  
**National Seminar on Recent Trends in Physics Research**, Manipur University, Manipur, India. (online)  
1-day conference on **Emerging Trends in High Energy Astrophysics (ETHEAP)**, Tezpur University, Assam, India. (online)  
**40<sup>th</sup> Meeting of the Astronomical Society of India**, IIT-Roorkee, Uttarakhand, India.  
**ICTS Summer School on Gravitational-Wave Astronomy**, ICTS-TIFR, Bengaluru, India. (online)  
**Nuclear Physics in Astrophysics-X conference**, CERN, Geneva, Switzerland. (online)
- 2023 **Bridging the Gaps: Interdisciplinary Collaborations in Constraining the Physics of Finite Nuclei, Neutron Stars and Dark Matter**, NIT-Rourkela, Odisha, India. (online)  
National conference **SPARK-2023 (Symposium on Physics: Advances in Research and Knowledge)**, North Lakhimpur University, Assam, India  
**North-East Meet of Astronomers-9 (NEMA-9)**, Mizoram University, Mizoram, India  
**67th DAE Symposium on Nuclear Physics**, Indian Institute of Technology Indore, Madhya Pradesh, India
- 2024 **GU ICARD-IUCAA Pedagogic Workshop on Astronomy, Astrophysics and Cosmology**, Gauhati University, Assam, India (to attend)

## Presented

- 2017 Oral presentation entitled “Investigation on the Radio Properties of Narrow-Line Seyfert Type-I Galaxies” at **North-East Meet of Astronomers-3 (NEMA-3)**, Assam Don Bosco University, India.
- 2020 Oral presentation entitled “Dense matter equation of state in strong magnetic field model with density-dependent parameterization” at **XXIV DAE-BRNS HEP Symposium**, NISER, Odisha, India. (online)
- 2022 Poster presentation entitled “Exotic dense matter in view of astrophysical observations” at **21<sup>st</sup> National Space Science Symposium**, IISER-Kolkata, West Bengal, India. (online)  
Oral presentation entitled “Constraining exotic dense matter equation of states in view of gravitational-wave observations” at **National Seminar on Recent Trends in Physics Research**, Manipur University, Manipur, India. (online)  
Poster presentation entitled “Dense baryonic matter in light of recent astrophysical observations” at **40th Meeting of the Astronomical Society of India**, IIT-Roorkee, Uttarakhand, India.

## Schools, Workshops & Conferences (continued)

- Poster presentation entitled “Tension between implications from PREX-2 data and gravitational tidal response on dense matter equation of state” at **Nuclear Physics in Astrophysics-X conference**, CERN, Geneva, Switzerland. (online)
- Oral presentation entitled “Potentiality of (anti)kaon condensation in dense matter” at **66th DAE Symposium on Nuclear Physics**, Cotton University, Assam, India.
- 2023 Oral presentation entitled “Nuclear symmetry energy slope and its impact on exotic magnetized matter” at **SPARK-2023 (Symposium on Physics: Advances in Research and Knowledge)**, North Lakhimpur University, Assam, India.
- Oral presentation entitled “Influence of hot and cold dense matter on quasinormal oscillation modes of compact stars” at **North-East Meet of Astronomers-9 (NEMA-9)**, Mizoram University, Mizoram, India.
- Oral presentation entitled “Implications of symmetry energy on neutron star cooling” at **67th DAE Symposium on Nuclear Physics**, Indian Institute of Technology Indore, Madhya Pradesh, India.

## Invited Talks

- 2021 Departmental Student Seminar series talk on “Astrophysical observables as a tool to probe dense matter physics” at IIT Jodhpur, India.
- 2022 Invited talk entitled “Neutron stars: Astrophysical laboratories to probe dense matter” at Department of Physics, Debraj Roy College, Golaghat, Assam, India.
- Invited talk entitled “Exotic cold dense matter in light of gravitational-wave observations” at RIKEN-iTHEMS, Tokyo, Japan. (online)
- Invited talk entitled “Cold dense matter in light of neutron star astrophysical constraints” at Department of Nuclear Physics, Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH), Bucharest, Romania.
- Invited talk entitled “Investigation of exotic particle spectrum in cold compact stars” at Institute of Theoretical Physics, University of Wrocław, Poland.
- 2023 Invited lecture entitled “Understanding ground state of matter in light of neutron stars” on “*Lecture series on compact objects*” at Indian Institute of Technology Roorkee, Uttarakhand, India. (online)
- Invited talk entitled “Cold exotic dense matter in light of neutron star astrophysical constraints” at Institute of Nuclear and Particle Physics, School of Physics and Astronomy, Shanghai Jiao Tong University, Shanghai, China. (online)

## Professional Courses/ Programmes

### Attended

- 2023 **Two Day Induction Training Programme**, Higher Education Department, Government of Assam, Assam Administrative Staff College, Assam, India
- Online Month-long Faculty Induction Programme**, Teaching Learning Centre, Tezpur University, Assam, India
- 2024 **Faculty Enrichment Programme**, GU ICARD-IUCAA Pedagogic Workshop, Gauhati University, Assam, India (to attend)

## Academic Extensions

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- July – December 2015     **Basic Radio Astronomy Course**, Cotton University, Assam, India. Mentor: Dr. Wasim Raja, Post-doctoral fellow, CSIRO Astronomy & Space Science, Australia
- May – July 2017     **Summer Research Fellow**, Indian Institute of Astrophysics (IIA), Bengaluru, Karnataka, India. Mentor: Prof. C. S. Stalin, Professor, IIA;  
Co-mentor: Dr. Suvendu Rakshit, Scientist-C, Aryabhata Research Institute of Observational SciencES (ARIES), India
- June – July 2022     **Visiting Scholar**, Variable Energy Cyclotron Centre (VECC), Kolkata, West Bengal, India.
- November 2022     **Visitor**, Institute of Theoretical Physics, University of Wrocław, pl. M. Borna 9, 50-204 Wrocław, Poland.

## Teaching experience

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3. Teaching the following courses at Bhawanipur Anchalik College:
  - **Academic Session 2023-24:**
  - i. Mathematical Physics-I (PHY101) for B.Sc. 1st Semester
  - ii. Introduction to Natural and Physical Sciences (MDC-1) for UG 1st Semester
2. Assisted in guiding 4 M.Sc. students in their thesis work.
1. Teaching assistant in the following courses at IIT Jodhpur:
  - i. General Theory of Relativity for M.Sc. students
  - ii. Quantum Field Theory for M.Sc. students
  - iii. Introductory Physics Lab for B.Tech. students
  - iv. Introduction to electromagnetic theory for B.Tech. students

## Administrative roles

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1. Co-ordinator of **Physics Laboratory**, Bhawanipur Anchalik College (June 2023 - till date)
2. Co-ordinator of **Energy Audit Cell**, Bhawanipur Anchalik College (June 2023 - till date)
3. Co-ordinator of **Green Earth Club**, Bhawanipur Anchalik College (June 2023 - till date)
4. Web-master of **Departmental website (Physics)**, Bhawanipur Anchalik College (June 2023 - till date)
5. Member, **Institution's Innovation Council**, Bhawanipur Anchalik College (June 2023 - till date)
6. Member, **Institute Purchasing Committee**, Bhawanipur Anchalik College (August 2023 - till date)

## Government Duties/ Trainings

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- 2023     Attended "**Training programme of External Evaluator for Gunotsav-2024 (5th Round)**", Anundoram Borooah Academy, Pathsala, Assam

## Research Publications

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### Accepted/Published Journal Articles




- 1 Sarkar, T., **Thapa, V. B.**, & Sinha, M. (2023). Fast neutron star cooling in light of the prex-2 experiment. *Physical Review C*, **108**, 035801.  doi:10.1103/PhysRevC.108.035801. eprint: <https://arxiv.org/abs/2308.16449>
- 2 **Thapa, V. B.**, Beznogov, M., Raduta, A. R., & Thakur, P. (2023b). Frequencies of  $f$ - and  $p$ -oscillation modes in cold and hot compact stars. *Physical Review D*, **107**, 103054.  doi:10.1103/PhysRevD.107.103054. eprint: <https://arxiv.org/abs/2302.11469>
- 3 Kumar, A., **Thapa, V. B.**, & Sinha, M. (2023). Hybrid stars are compatible with recent astrophysical observations. *Physical Review D*, **107**, 063024.  doi:10.1103/PhysRevD.107.063024. eprint: <https://arxiv.org/abs/2303.06387>
- 4 Kundu, D., **Thapa, V. B.**, & Sinha, M. (2023). (Anti)kaon condensation in strongly magnetized dense matter. *Physical Review C*, **107**, 035807.  doi:10.1103/PhysRevC.107.035807. eprint: <https://arxiv.org/abs/2210.14565>
- 5 Kumar, A., **Thapa, V. B.**, & Sinha, M. (2022). Compact star merger events with stars composed of interacting strange quark matter. *Monthly Notices of the Royal Astronomical Society*, **513**, 3788.  doi:10.1093/mnras/stac1150. eprint: <https://arxiv.org/abs/2204.11034>
- 6 **Thapa, V. B.**, & Sinha, M. (2022b). Influence of the nuclear symmetry energy slope on observables of compact stars with  $\Delta$ -admixed hypernuclear matter. *Physical Review C*, **105**, 015802.  doi:10.1103/PhysRevC.105.015802. eprint: <https://arxiv.org/abs/2112.12629>
- 7 **Thapa, V. B.**, Kumar, A., & Sinha, M. (2021). Baryonic dense matter in view of gravitational-wave observations. *Monthly Notices of the Royal Astronomical Society*, **507**, 2991–3004.  doi:10.1093/mnras/stab2327. eprint: <https://arxiv.org/abs/2108.04318>
- 8 **Thapa, V. B.**, Sinha, M., Li, J. J., & Sedrakian, A. (2021). Massive  $\Delta$ -resonance admixed hypernuclear stars with antikaon condensations. *Physical Review D*, **103**, 063004.  doi:10.1103/PhysRevD.103.063004. eprint: <https://arxiv.org/abs/2102.08787>
- 9 **Thapa, V. B.**, & Sinha, M. (2020). Dense matter equation of state of a massive neutron star with antikaon condensation. *Physical Review D*, **102**, 123007.  doi:10.1103/PhysRevD.102.123007. eprint: <https://arxiv.org/abs/2011.06440>
- 10 **Thapa, V. B.**, Sinha, M., Li, J. J., & Sedrakian, A. (2020). Equation of state of strongly magnetized matter with hyperons and  $\Delta$ -resonances. *Particles*, **3**, 660–675.  doi:10.3390/particles3040043. eprint: <https://arxiv.org/abs/2010.00981>

### Pre-prints


- 1 Ghosh, M. K., Kumar, A., Thakur, P., **Thapa, V. B.**, & Sinha, M. (2023). *Universal relations in compact stars with exotic degrees of freedom*. arXiv: 2311.15277 [astro-ph.HE]
- 2 **Thapa, V. B.**, & Sinha, M. (2022a). *Direct URCA process in light of PREX-2*. arXiv: 2203.02272 [astro-ph.HE]

### Conference Proceedings

- 1 **Thapa, V. B.**, Sarkar, T., & Sinha, M. (2023a). Implications of symmetry energy on neutron star cooling. In *Proceedings of the 67th DAE Symposium on Nuclear Physics (ISBN: 978-12-345678-9-7)* (Vol. **67**, pp. 783–784).  doi: <http://www.symnpn.org/proceedings/67/C6>

- 2 **Thapa, V. B.,** & Sinha, M. (2023). Tension between implications from PREX-2 data and gravitational tidal response on dense matter equation of state. In *EPJ Web of Conferences* (Vol. 279, p. 10003).  doi:10.1051/epjconf/202327910003. eprint: <https://arxiv.org/abs/2302.07726>
- 3 **Thapa, V. B.,** Sinha, M., Sedrakian, A., & Li, J. J. (2022). Potentiality of antikaon condensation in dense matter. In *Proceedings of the 66th DAE Symposium on Nuclear Physics* (ISBN: 978-81-959225-1-2) (Vol. 66, pp. 734–735).  doi:<http://www.sympnp.org/proceedings>
- 4 **Thapa, V. B.,** Sinha, M., Li, J. J., & Sedrakian, A. (2022). Dense matter in strong magnetic field: Covariant density functional approach. In *Springer Proceedings in Physics* (Vol. 277, pp. 755–759).  doi:10.1007/978-981-19-2354-8\_136

## Books and Chapters

- 1 **Thapa, V. B.,** Sarkar, T., & Singha, J. (2021). Probing dense matter equation of state in view of neutron star astrophysical observables. In R. Jayakumar & R. R. Duvvuru (Eds.), *Research trends in multidisciplinary research* (Vol. 29, pp. 41–66).  doi:10.22271/ed.book.1306

## Journal peer-reviewer

Monthly Notices of the Royal Astronomical Society, Oxford University Press  
Physical Review & Physical Review Letters, American Physical Society




## Membership(s)

- 2022 Life member, Physics Academy of the North-East India  
Life member, Astronomical Society of India

## Professional Collaborations

Indian Institute of Technology Jodhpur, India  
Variable Energy Cyclotron Centre, India  
National Institute for Physics and Nuclear Engineering (IFIN-HH), Romania  
Institute of Theoretical Physics, University of Wrocław, Poland  
Frankfurt Institute for Advanced Studies, Germany  
School of Physical Science and Technology, Southwest University, China

## Professional References

- |                       |                                                                                                                                                                                                                                                                                                              |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dr. Monika Sinha      | Associate Professor, Indian Institute of Technology Jodhpur<br>Address- Room No.-333, Department of Physics, IIT Jodhpur, Rajasthan, India<br> <a href="mailto:ms@iitj.ac.in">ms@iitj.ac.in</a>                           |
| Prof. Armen Sedrakian | Associate Professor, Institute of Theoretical Physics, University of Wrocław<br>Address- pl. M. Born'a 9, 50-204 Wrocław, Poland<br> <a href="mailto:sedrakian@fias.uni-frankfurt.de">sedrakian@fias.uni-frankfurt.de</a> |
| Dr. Rupjyoti Gogoi    | Assistant Professor, Tezpur University<br>Address- Department of Physics, Tezpur University, Assam, India<br> <a href="mailto:rupjyotigogoi@gmail.com">rupjyotigogoi@gmail.com</a>                                        |

## **Professional References (continued)**

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- Prof. Gargi Chaudhuri      Professor, Scientific Officer (F), Variable Energy Cyclotron Centre  
Address- Physics Group, Kolkata, India  
✉ gargi@vecc.gov.in
- Prof. Adriana R. Raduta      Senior Researcher 1st degree, Horia Hulubei National Institute for Physics and  
Nuclear Engineering (IFIN-HH)  
Address- Department of Nuclear Physics, IFIN-HH, Bucharest, România  
✉ araduta@nipne.ro

## **Declaration**

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I hereby declare that the information in this curriculum vitae and additional particulars furnished is correct and true to the best of my knowledge.

December 22, 2023  
Barpeta, Assam, India

**Vivek Baruah Thapa**