

ZENIA ZURAIQ

I am a Ph.D. student and Prime Minister's Research Fellow at the Department of Physics, IISc Bengaluru. I am also an associate member of the Indian Pulsar Timing Array (InPTA) collaboration.

Contact

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Academic Qualifications

PH.D. (THEORETICAL PHYSICS) | 2022 - PRESENT

*Indian Institute of Science, Bengaluru
CGPA: 9.1/10 (one year coursework)*

M.SC. (PHYSICS) | 2020 - 2022

*National Institute of Technology, Tiruchirappalli (NIT-T)
CGPA: 9.79/10 (Gold medalist)
Master's Thesis: "Effects of fermion mass and strong two-body interactions on the mass-radius relationship of non-rotating compact stars"*

B.SC. (PHYSICS) | 2017-2020

*Stella Maris College, University of Madras
CGPA: 9.31/10 (Silver medalist)*

Internships and summer schools

IIA Summer Programme

Indian Institute of Astrophysics, Bengaluru, India | 07/21

Vigyan Vidushi

Tata Institute of Fundamental Research, Mumbai, India | 05-06/2021

Introductory Summer School in Astronomy and Astrophysics

Inter-University Centre for Astronomy and Astrophysics, Pune, India | 05/21

National Institute on Undergraduate Sciences (NIUS) Camp (15.1)

Tata Institute of Fundamental Research, Mumbai, India | 06/18

Summer Intern

IICUNN, Mahatma Gandhi University, Kottayam, India | 05/18

Skills

Programming Languages: Python, C++, MATLAB, Mathematica

Tools/Codes: LaTeX, MS Office, MESA, Cambridge STARS

OS: Linux, Windows, macOS

Publications

Zuraiq, Z., Mukhopadhyay, B. and Weber, F., 'Massive neutron stars as mass gap candidates: Exploring equation of state and magnetic field', Phys. Rev. D 109 (2024) 2, 023027, arXiv: [2311.02169](https://arxiv.org/abs/2311.02169)

Zuraiq, Z., Mukhopadhyay, B. and Weber, F., 'Exploring massive neutron stars towards the mass gap: constraining the high-density nuclear equation of state', Astron. Rep. 67 (2023) Suppl 2, S199-S206

Zuraiq, Z., Kumar, A., Hackett, A. J., Bhattarai, S., Tout, C. A. and Mukhopadhyay, B., 'Simulating super-Chandrasekhar white dwarfs', Astrophysics and Space science proceedings, Springer (accepted, 2024)
To appear in the special volume published as part of the International Symposium on Recent Developments in Relativistic Astrophysics

Zuraiq, Z., Kumar, A., Hackett, A. J. and Mukhopadhyay, B., 'Simulating magnetized white dwarfs by time evolution: Chandrasekhar limit and beyond', World Scientific (accepted, 2024)
To appear in the proceedings of the "Massive white dwarfs and related phenomena" parallel session of the 17th Marcel Grossmann meeting

Zuraiq, Z., Das, M., Weber, F. and Mukhopadhyay, B., 'Massive, magnetized neutron stars', Progress in Particle and Nuclear Physics (submitted, 2024)
To appear as part of the White Paper on "QCD in Strong Magnetic Fields", compiled as part of the ECT workshop, "Strongly interacting matter in extreme magnetic fields"*

Rana, P. et. al. (47 authors including **Zuraiq, Z.**), 'The Indian Pulsar Timing Array Data Release 2: I. Dataset and Timing Analysis' (submitted, 2024)

Awards & Scholarships

- Prime Minister's Research Fellowship (Direct Entry, Cycle 9)
- AIR 36 (JRF), CSIR-NET 2021 (out of 28135 candidates)
- AIR 51, GATE-PH 2022 (out of 19375 candidates)
- AIR 198, JEST 2022 (96.12 Percentile)
- AIR 669, IIT-JAM 2020 (out of 16379 candidates)

Conferences attended

Conference on Classical and Quantum Gravity

CUSAT, Cochin, India | 05/11/24 - 07/11/24

17th Marcel Grossmann meeting

Pescara, Italy | 07/07/24 - 12/07/24

PMRF Annual Symposium, 2024

IIT Indore, Indore, India | 03/03/24 - 04/03/24

Meeting on Pulsar Timing Array Experiments:

Present and Future of Indian Collaboration

IMSc, Chennai, India | 05/02/24 - 09/02/24

42nd annual meeting of the Astronomical Society of India (ASI)

IISc, Bengaluru, India | 31/01/24 - 04/02/24

International Symposium on Recent

Developments in Relativistic Astrophysics

SRM Sikkim, Gangtok, India | 11/12/23 - 13/12/23

10th International Conference on Gravitation and Cosmology (ICGC)

IIT Guwahati, Guwahati, India | 06/12/23 - 09/12/23

3rd Conference on Plasma Simulations

Raman Science Center, IIA, Leh, India | 13/07/23 - 15/07/23

Fifth Zeldovich meeting

Yerevan, Armenia | 12/06/23 - 16/06/23

Teaching

- PMRF teaching assistant for the NPTEL course: "The Joy of Computing using Python" | 07/24-10/24
- Taught value-added course on Introductory Astronomy and Astrophysics, M.S. Ramaiah University of Applied Sciences, Bengaluru | 04/24 - 06/24
- PMRF teaching assistant for the NPTEL course Nuclear Astrophysics | 01/24 - 03/24
- Teaching assistant for the course, Introductory Mechanics, IISc (*Best TA Award*) | 08/23 - 12/23
- Taught Introductory Astronomy for students of classes VI-X, SPARC Public School | 08/23 - 12/23
- Taught class XI students NCERT physics, Kendriya Vidyalaya (IISc) | 01/23 - 06/23

Outreach

- Talk: "Looking out at the universe: multi-wavelength astronomy", SERB outreach program for class X students, IISc | 10/24
- Volunteer at 42nd annual meeting of the Astronomical Society of India, Bengaluru, India | 02/24
- Involved in organization of activities at IISc Open Day. Took part in activities like conducting a quiz, giving public talk on The Sun and Solar System | 2023, 2024
- PMRF outreach talk: Overview of fermionic compact stars: Non-interacting stars and white dwarfs, Christ University, Bengaluru | 02/23
- PMRF outreach talk: Overview of fermionic compact stars: Introducing interactions, Christ University, Bengaluru | 04/23
- External expert for Q/A session at "National Workshop on physical sciences for CSIR-UGC NET and GATE aspirants", conducted by NIT-T | 05/23

Talks

Anisotropic neutron stars as mass gap candidates

Conference on Classical and Quantum Gravity | 05/11/24

A journey towards compact star physics... and beyond!

Stella Maris College Research Day talk (invited) | 02/09/24

Massive, magnetized neutron stars as mass gap objects

Parallel session: Galactic and extragalactic magnetars: recent observations and theoretical progress, 17th Marcel Grossmann meeting | 11/07/24

Simulating magnetized white dwarfs by time evolution: Chandrasekhar limit and beyond

Parallel session: Massive white dwarfs and related phenomena, 17th Marcel Grossmann meeting | 08/07/24

Simulating super-Chandrasekhar white dwarfs

International Symposium on Recent Development in Relativistic Astrophysics | 12/12/23

Massive, magnetized compact stars: Theory and Simulation

10th International Conference on Gravitation and Cosmology | 09/12/23

Massive neutron stars: Effect of EOS vs magnetic field

London-Oldenburg Relativity Seminar (invited, online) | 18/10/23

Massive neutron stars: effects of EOSs and magnetic field

ECT* workshop: Strongly interacting matter in extreme magnetic fields (online) | 27/09/23

Exploring massive neutron stars towards the mass gap: Constraining the high density nuclear equation of state

Fifth Zeldovich Meeting | 15/06/23

Posters

Massive neutron stars as mass gap candidates

PMRF Annual Symposium 2024 (invited) | 04/03/24

Simulating super-Chandrasekhar white dwarf from main sequence star:

Exploring stellar evolution codes STARS and MESA

Parallel session: Stars, Interstellar Medium, and Astrochemistry in Milky Way
42nd annual meeting of the Astronomical Society of India | 01/02/24 - 02/02/24

Massive neutron stars as mass gap candidates | *Best poster award*

In-House Symposium, Department of Physics, IISc | 09/11/24-10/11/24

Simulating magnetised super-Chandrasekhar white dwarfs using STARS

3rd Conference on Plasma Simulations | 13/07/23 - 15/07/23

Research visits

Instytut Fizyki Teoretycznej, Uniwersytet Wroclawski (University of Wroclaw)

Wroclaw, Poland | 15/07/24 - 20/07/24

University of Warsaw

Warsaw, Poland | 13/07/24 - 14/07/24

ICRANet-Ferrara, University of Ferrara

Ferrara, Italy | 24/06/24 - 04/07/24

Selected short-term research projects

Study of the magnetised cataclysmic variable (CV) system, BY Cam

Guide: Dr. Vikram Rana (Raman Research Institute) | 01/23 - 04/23

Observation of 21cm line using custom made radio telescope from Milky Way galactic plane

Guide: Dr. R. Justin Joseyphus (NIT-T) | 01/22 - 08/22

Effects of fermion mass and strong two-body interactions on the mass-radius relationship of non-rotating compact stars (M.Sc. Thesis)

Guide: Dr. Somnath Mukhopadhyay (NIT-T) | 12/21 - 05/22