

Dr. Jeet Amrit Pattnaik, Ph.D.

Assistant Professor (Guest Faculty) at 'Indira Gandhi Institute of Technology (IGIT), An Autonomous Institute of Govt. of Odisha', Sarang, Dhenkanal, Odisha, India, PIN-759146

Former Visiting Research Associate at 'Institute of Physics', Bhubaneswar-751005

Former Ph.D. Fellow at 'Department of Physics, Siksha 'O' Anusandhan (Deemed to be) University', Bhubaneswar -751030, India

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Scopus/SCI Articles: 22 Published, 04 Communicated

Ph.D. Supervisors

Associate Professor

Dr. Rabinarayan Panda, Department of Physics, Siksha 'O' Anusandhan (Deemed to be) University, Bhubaneswar -751030, India.
Email: rabinarayanpanda@soa.ac.in

Distinguished Professor

Dr. Suresh Kumar Patra, (Retd.) from Institute of Physics, Bhubaneswar, (Presently at) Department of Physics, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar -751030, India.
Email: patra@iopb.res.in/sureshpatra@soa.ac.in

Education

- 2022 – 2025 Ph.D. in Nuclear Physics Theory, Department of Physics, Siksha 'O' Anusandhan, Deemed to be University, Bhubaneswar -751030, India.
- 2022 – 2023 Senior Research Fellow, SERB, DST, Department of Physics, Siksha 'O' Anusandhan, Deemed to be University, Bhubaneswar -751030, India
- 2020 – 2022 Junior Research Fellow, SERB, DST Department of Physics, Siksha 'O' Anusandhan, Deemed to be University, Bhubaneswar -751030, India
- 2016 – 2018 M.Sc. in Physics (Nuclear Physics), Sambalpur University, Burla, India.
- 2013 – 2016 B.Sc. in Physics, Nayagarh Auto. College, Nayagarh, Odisha, India

Research Experience

- July 2025 – March 2026 Visiting Research Associate
Institute of Physics, Bhubaneswar, India
- Oct 2020 – July 2025 Visiting Fellow (Long-term)
Institute of Physics, Bhubaneswar, India

Scholarship, Fellowships, Awards

- 2025  **"Best Poster Award in Nuclear Astrophysics"** and the cash prize at the **Odisha Physical Society's (OPS)** 41st Annual Convention during the "International Conference on Emerging Trends in Physics" (ICETP) 2025 at **KIIT - Kalinga Institute of Industrial Technology**.
- 2022–2023  **Senior Research Fellow** by DST-SERB, India.
- 2020–2022  **Junior Research Fellow** by DST-SERB, India.
- 2020–2023  **National Scholarship** (GATE).
- 2019–2021  **Subject Matter Expert-Advanced Physics** at 'CHEGG'.
- 2016–2018  **National Scholarship (M.Sc.)** by DST-INSPIRE, India.
- 2013–2016  **National Scholarship (B.Sc.)** by DST-INSPIRE, India.
- 2013  **Pathani Samanta Mathematics Scholarship** by School & Mass Education Department, Odisha, India.

Teaching Experiences

1. **Diploma Course:** (Applied Physics-II, Course Code- TH-2)
2. **B.tech Course:** (Physics, Course Code-BSPY1102)
3. **M.Sc Course:** (Quantum Mechanics-I, Course Code-APC103)
4. **M.Sc Course:** (Specialisation: Nuclear Physics-I, Course Code-APE302)
5. **M.Sc Course:** (Specialisation: Nuclear Physics-II, Course Code-APE402)

Professional Affiliations / Memberships

1. **Life Member**, **Samanta Chandra Sekhar Amateur Astronomers' Association (SCAAA)**, Bhubaneswar, Odisha, India.
2. **Active Member**, **Institute of Philosophy of Nature (IPN)**, Bhubaneswar, Odisha, India.

Skills

1. **Language:** English, Hindi, Odia
2. **Coding:** Fortran77, Python, Mathematica, $\text{\LaTeX}$,...
3. **Operating Systems:** Unix, Linux (Ubuntu, Fedora), Windows
4. **Teaching:** Nuclear and Particle Physics, Quantum Mechanics, Mathematical Physics,...

Fields of Research

- **Broad Areas:**
nuclear physics, nuclear astrophysics, dense matter, compact objects, neutron stars, exotic nuclei, nuclear matter, equation of state, stellar matter, nuclear reactions, nuclear structure,

symmetry energy, astroparticle physics, relativistic astrophysics, extreme conditions, stellar evolution

- **Specific Focus Areas:**

neutron star structure, neutron star oscillations, mass–radius relation, tidal deformability, moment of inertia, surface curvature, dark matter in neutron stars, quarkyonic matter, two-fluid formalism, relativistic mean-field theory, nuclear symmetry energy, shell structure, magic numbers, nuclear drip lines, r-process nucleosynthesis, nuclear reaction rates, beta decay, fission and fusion dynamics, nuclear deformation, collective excitations, giant resonances

Research Publications

(a) Publications in Refereed Journals:-

Academic Year - 2026

1. Dirac vs. Majorana Dark Matter Imprints on Neutron Star Observables, M. Bhuyan, **Jeet Amrit Pattnaik**, S. K. Patra and S. Patra, arXiv:2512.09498 [astro-ph.HE], **Phys. Lett. B**, **881**, (2026) 140960.
2. Quarkyonic Neutron Stars as Candidates for the GW230529 Mass-Gap Object, **Jeet Amrit Pattnaik**, and S. K. Patra, arXiv:2511.14266 [astro-ph.HE], **Int. Jour. Mod. Phys. D**, **35**, (2026) 2650015. <https://doi.org/10.1142/So21827182650015X>.
3. w -mode oscillation of neutron star in a new relativistic hybrid model, D. Dey, **Jeet Amrit Pattnaik**, R. N. Panda, and S. K. Patra, arXiv:2509.01175 [astro-ph.HE], **Nucl. Phys. B**, **1029**, (2026) 117519.
4. Universality in Space Time ω modes of Quarkyonic Stars, D. Dey, **Jeet Amrit Pattnaik**, R. N. Panda, and S. K. Patra, arXiv:2602.22641 [astro-ph.HE], **Phys. Rev. D**, **113**, (2026) 123034.
5. Constraining nuclear matter properties through giant monopole resonances in a relativistic mean field approach in conjunction with coherent density fluctuation model, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan, S. Kumar, S. K. Singh, and S. K. Patra, **Accepted in Pramana Journal of Physics**, (2026).
6. Exploring the giant monopole resonance in superheavy nuclei: A theoretical perspective, S. Kumar, **Jeet Amrit Pattnaik**, S. K. Singh, R. N. Panda, M. Bhuyan, and S. K. Patra, arXiv:2504.17330 [nucl-th], **Phys. Part. Nuclei Lett.**, **23**, (2026) 287.

Academic Year - 2025

1. Core or Halo? Two-Fluid Analysis of Dark Matter-Admixed Quarkyonic Stars in the Multi-Messenger Era, **Jeet Amrit Pattnaik**, D. Dey, M. Bhuyan, R. N. Panda, and S. K. Patra, arXiv:2509.06684 [astro-ph.HE], Communicated to Physical Review D, (2025).
2. Anomalous Behavior of Giant Monopole Resonance Energy with Nuclear Matter Incompressibility in the framework of Relativistic Mean Field Formalism and Coherent Density Fluctuation Model, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan, and S. K. Patra, arXiv:2508.05291 [nucl-th], Communicated to Euro Physics Letter, (2025).
3. Superheavy Nuclei and the Changing Face of Nuclear Magicity, **Jeet Amrit Pattnaik**, S. Kumar, S. K. Singh, R. N. Panda, M. Bhuyan, and S. K. Patra, arXiv:2503.22260 [nucl-th], Communicated to Annals of Physics, (2025).

4. Dark Matter Effects on the Curvature of Neutron Stars within the new Quarkyonic Model Coupled with Relativistic Mean Field Theory, **Jeet Amrit Pattnaik**, D. Dey, R. N. Panda, M. Bhuyan, S. K. Patra, arXiv:2501.11435 [astro-ph.HE], Communicated to Journal of Cosmology and Astroparticle Physics, (2025).
5. Effects of Spacetime Curvature on the Gravitational Redshift in Dark Matter-admixed Quarkyonic Stars, **Jeet Amrit Pattnaik**, D. Dey, R. N. Panda, M. Bhuyan, S. K. Patra, Orissa Journal of Physics **31**, (2025) 154.
6. Structural properties of Sc-isotopic series under relativistic mean field approach, **Jeet Amrit Pattnaik**, and R. N. Panda, Physics of Particle and Nuclei Letters **22**, (2025) 18.
7. Dark matter influence on Quarkyonic stars: A Relativistic Mean Field Analysis, D. Dey, **Jeet Amrit Pattnaik**, H. C. Das, A. Kumar, R. N. Panda, and S. K. Patra, Journal of Cosmology and Astroparticle Physics **01**, (2025) 056.
8. f-mode oscillations of dark matter admixed quarkyonic neutron star, D. Dey, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan, S. K. Patra, arXiv:2412.06739 [astro-ph.HE], Journal of Cosmology and Astroparticle Physics, **08**, (2025) 003.
9. Examining the $Z = 126$ magic neutron number combinations in the super heavy valley using relativistic mean field formalism, **Jeet Amrit Pattnaik**, K. Dash, R. N. Panda, Physics of Particle and Nuclei Letters **22** 448, (2025).

Academic Year - 2024

1. Constraining neutron star properties and dark matter admixture with the NITR-I equation of state: Insights from observations and universal relations, P. Routaray, H. C. Das, **Jeet Amrit Pattnaik**, and B. Kumar, International Journal of Modern Physics E **33** 2450052 (2024).
2. Elucidate the non-relativistic and relativistic energy density functional from momentum space to coordinate space within local density approximation, **Jeet Amrit Pattnaik**, M. Bhuyan, R. N. Panda and S. K. Patra, International Journal of Modern Physics E, **33** 2450040 (2024).

Academic Year - 2023

1. Structure and reaction study of $Z=120$ isotopes using non-relativistic and relativistic mean-field formalism, **Jeet Amrit Pattnaik**, K. C. Naik, R. N. Panda, M. Bhuyan and S. K. Patra, Pramana-Journal of Physics, **97** (2023) 136.
2. Surface and decay properties of newly synthesised $^{207,208}\text{Th}$ isotopes for various α -decay chains, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan and S. K. Patra, Nuclear Physics A **1038** (2023) 122722.
3. Constraining the surface curvature of an anisotropic neutron star, H. C. Das, **Jeet Amrit Pattnaik** and S. K. Patra, Physical Review D **107** (2023) 083007.

Academic Year - 2022

1. Isotopic shift in Hg-isotopes within Brückner versus relativistic energy density functional, **Jeet Amrit Pattnaik**, J. T. Majekodunmi, M. Bhuyan and S. K. Patra, Foundations **2** (2022) 898.

2. Constraining the relativistic mean field models from PREX-2 data: effective forces re-visited, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan and S. K. Patra, Chinese Physics C **46** (2022) 094103; arXiv:2105.14479.
3. Systematic study for the surface properties of neutron stars, A. Kumar, H. C. Das, **Jeet Amrit Pattnaik**, and S. K. Patra, Physical Review C **105** (2022) 045804.
4. Appearance of a peak in symmetry energy at $N=126$ for the Pb isotopic chain within the relativistic energy density functional, **Jeet Amrit Pattnaik**, T. M. Joshua, A. Kumar, M. Bhuyan and S. K. Patra, Physical Review C **105** (2022) 014318.
5. Surface properties for Ne, Na, Mg, Al, and Si isotopes in the coherent density fluctuation model using the relativistic mean field densities, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan and S. K. Patra, Canadian Journal of Physics **100** (2022) 102.

Academic Year - 2021

1. Isotopic shift and search of magic number in the superheavy region, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan and S. K. Patra, Physica Scripta **96** (2021) 125319; arXiv:2106.03038.

(b) Contribution to Symposia/Conferences/Workshops:-

Academic Year - 2025

1. Unexpected Trend of ISGMR with Nuclear Matter Incompressibility in the RMF-CDFM Framework, **Jeet Amrit Pattnaik**, R. N. Panda, S. K. Patra, M. Bhuyan, Proceedings of DAE Symposium On Nuclear Physics **69**, 91, (2025).
2. Impact of Dark Matter on Axial Modes of Quarkyonic Neutron Star Debabrata Dey, **Jeet Amrit Pattnaik**, S.K. Patra, Proceedings of DAE Symposium On Nuclear Physics **69**, 807, (2025).
3. Thesis: Surface Properties of Finite Nuclei within Local Density Approximation Using Non-Relativistic and Relativistic Energy Density Functionals, **Jeet Amrit Pattnaik**, Proceedings of DAE Symposium On Nuclear Physics **69**, 1425, (2025).

Academic Year - 2024

1. Dark Matter Influence on Quarkyonic Stars: A Relativistic Mean Field Analysis, D. Dey, **Jeet Amrit Pattnaik**, and S. K. Patra, International Conference on Nuclear Physics and Applications (ICNPA-2024), Focus Issue on Current Status of Nuclear Physics and Applications, Physica Scripta (2024).
2. Influence of Dark Matter on Neutron Star Curvature within the Quarkyonic Model: A Relativistic Mean Field Approach, **Jeet Amrit Pattnaik**, D. Dey, R. N. Panda, M. Bhuyan, S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **68**, 763, (2024).
3. Dark Matter Effects on f-mode Oscillations in Quarkyonic Stars, D. Dey, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan, S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **68**, 765, (2024).

Academic Year - 2023

1. Tidal deformability of dark matter admixed neutron star within quarkyonic model in the conjunction of relativistic mean field formalism, **Jeet Amrit Pattnaik**, D. Dey, H. C. Das, A.

- Kumar, R. N. Panda, S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **67**, 805, (2023).
2. Relativistic mean-field study of neutron skin thickness and charge radii of 118-134 Sn isotopes, M. Imran, Z. Hasan, M. Ikram, and **Jeet Amrit Pattnaik**, Proceedings of DAE Symposium On Nuclear Physics **67**, 269, (2023).
 3. Quarkyonic model for dark matter admixed neutron Star: A RMF perspective, D. Dey, **Jeet Amrit Pattnaik**, A. Kumar, H. C. Das, R. N. Panda, S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **67**, 807, (2023).

Academic Year - 2022

1. Anisotropy Effects on the Neutron Star Properties, H. C. Das, A. Kumar, **Jeet Amrit Pattnaik**, S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **66**, 764, (2022).
2. Correlations among the surface properties of finite nuclei within the Coherent Density Fluctuation Model, **Jeet Amrit Pattnaik**, M. Bhuyan and S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **66**, 90, (2022).
3. Decay properties of newly synthesized $^{207,208}\text{Th}$ isotopes, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan and S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **66**, 656, (2022).

Academic Year - 2021

1. PREX-2 data: Revisit of Relativistic Mean Field forces, **Jeet Amrit Pattnaik**, M. Bhuyan, R. N. Panda and S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **65**, 156, (2021).
2. Isotopic shift for magic nuclei, **Jeet Amrit Pattnaik**, R. N. Panda, M. Bhuyan and S. K. Patra, Proceedings of DAE Symposium On Nuclear Physics **65**, 158, (2021).

Book Chapter(s)

- f-mode universal relation of dark matter admixed quarkyonic stars, Proceedings of the XXVI DAE-BRNS High Energy Physics (HEP) Symposium 2024, 19-23 December, Varanasi, India, Springer Proceedings in Physics (SPPHY, volume 432), <https://doi.org/10.1007/978-981-95-1513-4>.
- Exploring the Ground-State Properties of Scandium Isotopes Through Relativistic Mean Field Theory, S. Kumar, **Jeet Amrit Pattnaik**, S. K. Singh, R. N. Panda, M. Bhuyan, and S. K. Patra, NCFMP Conference, Adamas University, Springer Book Chapter, (2024).

Invited Talks/Seminar/Colloquium/Presentations

- **Invited Talk** at “National Workshop on Recent Advances in Quantum Dynamics, Nuclear and Astrophysics, 2026” at **Institute of Physics (IOP) Bhubaneswar**: Dark Matter–Admixed Quarkyonic Stars as the Secondary Object in GW190814: A Two-Fluid Study, 16 – 17th **February, (2026)**.

- **Invited Talk** at “Recent trends in Extreme nuclear matter and Cosmology, 2025” at **K.K.S. Women’s College, Balasore**: Two-Fluid Modeling of Dark Matter–Admixed Quarkyonic Stars in GW190814, 25 – 26th **November, (2025)**.
- **Invited Talk** at “The 2nd India-JINR Workshop on Particle, Nuclear, Neutrino Physics and Astrophysics, 2025” at **National Institute of Science Education and Research (NISER, Bhubaneswar)**: Dark Matter Admixed Quarkyonic Stars as the Secondary Object in GW190814: A Two-Fluid Analysis, 10 – 12th **November, (2025)**.
- **Invited Talk** on theme “New Frontiers in Extreme Nuclear Matter: Understanding the Intersection of Nuclear and Particle Physics” at **Institute of Physics (IOP, Bhubaneswar)**: Dark Matter Effects on the Curvature of Neutron Stars within the new Quarkyonic Model Coupled with Relativistic Mean Field Theory, 14th **February, (2025)**.
- **Talk**: Correlations among the surface properties of finite nuclei within the Coherent Density Fluctuation Model at 66th DAE Symposium On Nuclear Physics, Guwahati University Assam, (2022)
- **Talk**: Advantages of relativistic energy density functional over justified Brueckner’s functional in the prediction of the peak in symmetry energy at $N = 126$ for the Pb isotopic chain, National Conference on Low Energy Nuclear Reaction Dynamics, **Aligarh Muslim University(2022) (published in abstract book.)**
- **Talk**: Comparison between relativistic and Brueckner’s energy density functionals in the prediction of the peak in symmetry energy at $N = 126$ for the Pb isotopic chain, **Young Researcher’s Session, The Eleventh International School for Strangeness Nuclear Physics (SNP School 2022), Tohoku University, Sendai, Japan.**

Participation in Symposia, Schools and Conferences

- **International Webinar** on “New experiments on the so-called "Holy Grail" of nuclear astrophysics: $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$, organized by Department of Physics, Akal University, on 29 September (2025).
- **International Webinar** on “Understanding Shapes and Symmetries in Nuclei: The Most Reliable Energy Source for the Mankind, organized by Department of Physics, Akal University, on 03 March (2025).
- **Two-day National Workshop** on “Nuclear Spectrometry, organized by Department of Physics, Akal University, on 23-24 September (2024).
- **International Seminar** “Pedestrian Journey from Classical to Quantum Concepts” organized by Akal University, Talwandi Sabo, Punjab on September 03, (2024).
- **Springer Nature Conclave**, organized by S’O’A University at University Auditorium, Campus-II, Bhubaneswar on August 27 (2024).
You are informed to attend the One-day conclave and occupy your seat by 9.40 AM.
- **International Webinar** on “What You See Is What You Get: Compton Scattering Explores Nuclear Forces by Prof. Harald W. Griesshammer organized by Akal University, Talwandi Sabo, Punjab on August 08, (2024).
- **Workshop** on Dark Matter and Astroparticle Physics (WDMAP), Institute of Physics, Bhubaneswar, 07 - 09 August (2024).

- [Summer school](#) on “**Gravitational Wave and Astronomy**”, TIFR-ICTS, Bangalore, 01 – 12 July (2024).
- [International Webinar](#) on the “**Energy Traps in Atomic Nuclei**” by eminent nuclear physicist **Prof. P.M. Walker**, Emeritus Professor, organized by Akal University, Talwandi Sabo, Punjab, June 05, (2024).
- [International Webinar](#) on “**Nuclear Shell Model by Prof. P. Van. Isacker**” organized by **Akal University**, Talwandi Sabo, Punjab on May 02, (2024).
- [Onsite Turnitin Workshop](#) organized by S’O’A University at Bansuri Auditorium, ITER, on December 12 (2023).
- [International Conference](#) on “**International meetings on high energy physics (IMHEP-II)**”, **Institute of Physics, Bhubaneswar**, 16 - 22 February (2023).
- [One-day International Workshop](#) on “**Translating Glass Science into Technology**” organized by **Akal University**, Talwandi Sabo, Punjab on 25th July (2022).
- [Webinar](#) on “**Patenting Strategies in the 21st century.**” organized by **Akal University**, Talwandi Sabo, Punjab on June 3rd from 11:00 am-12:00 PM (2022).
- [Webinar](#) on “**Nanoengineering—Future for Sustainable World**” organized by **Akal University**, Talwandi Sabo, Punjab on May 6, (2022).
- [Webinar](#) on “**A Journey Through the Wonders of Physics with Atomic Nuclei by Dr. Kazuyuki SEKIZAWA**, Department of Physics, School of Science, Tokyo Institute of Technology, Japan organized by **Akal University**, Talwandi Sabo, Punjab on 30th March, (2022).
- [National Webinar](#) on “**Perspectives, challenges, and opportunities for students in the field of nuclear reactor physics in the Indian context**”, Department of Physics, **Akal University**, Talwandi Sabo, Bhatinda, 3rd March, (2022).
- [National Seminar](#) on “**Theme meetings on nuclear lifetimes and transitions and moments**” (NLTm2022), VECC, Kolkata, 01 - 03 February (2022).
- [ECT* TALENT SCHOOL 2021](#) on “**Machine Learning applied to Nuclear Physics, Experiment, and Theory**”, organized by the European Center for Theoretical Studies in Nuclear Physics and Related Areas, 19 to 30 July (2021).

My Potential Collaborators

1. Debabrata Dey, IOP Bhubaneswar, India.
2. Pinku Routray, NIT Rourkela, India.
3. Dr. Harish Chandra Das, INFN Catania, Italy.
4. Dr. Ankit Kumar, Kochi University, Japan.
5. T. M. Joshua, University of Malaya, Malaysia.
6. Santos Kumar, Pataliputra University, India.

7. Shailesh Kumar Singh, Pataliputra University, India.
8. Dr. Rabinarayan Panda, SOA University, Bhubaneswar, India.
9. Dr. Bharat Kumar, NIT Rourkela, India.
10. Dr. Mrutyunjaya Bhuyan, IOP Bhubaneswar, India.
11. Prof. Suresh Kumar Patra, SOA University, Bhubaneswar, India.