Utkarsh Patel

Linkedin: Utkarsh Patel - Linkedin
Inspire-HEP: Utkarsh Patel - INSPIRE
Google Scholar: Utkarsh Patel- Google Scholar
Wolfram Repository: Utkarsh Patel - Wolfram Community

Ph.D. scholar in the Dept. of Physics, IIT Bhilai
Domain: Theoretical High Energy Physics
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Ph.D. Supervisor: Dr. Sudhanwa Patra

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ACADEMIC QUALIFICATIONS:

Qualification	Name of Institution	Duration	Degree	Grades
Full-time Ph.D. Scholar (Currently enrolled)	Indian Institute of Technology, Bhilai (India)	2019-2024	Ph.D. in High Energy Physics (Domain: Astro-Particle Physics & Cosmology)	PhD synopsis submitted on 11.07.2024
Post-Graduation	Hansraj College, University of Delhi (India)	2016-2018	Master of Science with Specialization in Astrophysics, GTR, and Electronics	62.35 %
Under-Graduation	Motilal Nehru College, University of Delhi (India)	2013-2016	Bachelor of Science (Honors in Physics)	79.60 %

FIELD OF INTEREST:

As a physics student, I am deeply passionate about the fields of computational and theoretical astro-particle physics and cosmology. I actively engage with books and articles related to the subject and stay updated on ongoing research. Over the next few years, I aim to contribute to the advancement of this field through my hard work and perseverance.

TECHNICAL SKILLS:

Programming Languages: Wolfram Mathematica (Advanced Level), C, C++, Python, Java, MATLAB (Beginner level).
HEP-related Tools: SARAH(For HEP model framework development), micrOMEGAs(For Dark Matter related analysis), SPheno(Particle Spectrum Generator).
Database Tools: Microsoft SQL Server.
Other Tools: Bash Script Writing in LINUX terminal, Microsoft Office, Android Studio, Arduino Programming, Machine learning through Mathematica and Python.

SCIENTIFIC CONFERENCE PARTICIPATIONS:

- **Outside India**
  - Selected for presenting my work titled "**Leptogenesis in a Left-Right Symmetric Model with double seesaw**" at the NuFact 2024 conference to be held in Argonne National Laboratory, Illinois USA from 16-21 September 2024.
  - Presented a poster of my work titled "**Leptogenesis in a Left-Right Symmetric Model with double seesaw**" at the Neutrino 2024 conference held in Milan, Lombardia, Italy, from 16-22 June 2024.
  - Delivered an in-person parallel talk of my work titled "**Leptogenesis in a Left-Right Symmetric Model with double seesaw**" at the 22nd Conference on Flavor Physics and CP violation (FPCP 2024) held in Bangkok, Thailand, from 25 May to 1 June 2024.

- Delivered an in-person talk titled "**SIDM as a solution to small scale crisis**" at the conference "TMEX 2023", 19th Rencontres du Vietnam, held at Quy Nhon city, Vietnam from 5-11 January 2023.

- **Within India**
  - Delivered an in-person talk titled "**SIDM as a solution to small scale crisis**" at the conference "ICRTSE-2024", organized by Govt. V.Y.T. PG College, Durg, Chhattisgarh from 8-11 February 2024.
  - Attended a conference titled "IMHEP-II" held at IOP Bhubneshwar, Odisha, from 16-22 February 2023.
  - Presented a poster for my work titled "**Numerically analyzing Self-Interacting Dark Matter**" at the "DAE-HEP 2022" conference held at IISER Mohali from 12-16 December 2022.
  - Delivered an in-person talk at the Indian Institute of Physics, Bhubaneswar, on the topic "**SIDM as a solution to small-scale crisis**" on 14th March 2022 during an academic visit.

WORKSHOPS/ SCHOOLS PARTICIPATIONS:

- **Outside India**
  - Successfully completed a project titled **"Study of Statistical evolution of a gaseous system as a consequence of iterative simple rule"** under "Wolfram International Summer School 2023 (WSS23)" held at Illinois-USA in hybrid mode during July 2023.
  - Successfully completed a project titled **"Study of Regge Theory using 2-body motion in fractional spacetime"** under "Wolfram International Summer School 2022 (WSS22)" held at Illinois-USA in hybrid mode during July 2022.
  - Attended an online 1-month Summer School titled "**Summer School on High Energy Physics**" organized by SPRACE-Brazil from 22 February 2021 to 19 March 2021.
- **Within India**
  - Participated in a 10-day workshop named "**Sangam@HRI: Instructional workshop in Particle Physics**" at Harish-Chandra Research Institute from 07th-16th March 2024.
  - Successfully completed a project titled **"Smart backgrounds in simulation data using neural networks"** under "Wolfram India Winter School 2022 (WIS22)" held from December 2021- January 2022.
  - Completed a 5-day workshop on "**ATHENA++ and GWPY simulations"** at ASTROWIN2019 (Winter School on Astronomy).
  - Attended the online workshops on national and international post-doc funding opportunities named "**PRAYOJAN 2023**" on 22-23 April 2023 and "**PRAYOJAN 2024**" on 27-28 April 2024, organized online by INYAS.

LIST OF JOURNAL PUBLICATIONS & OTHER PUBLISHED CONTRIBUTIONS:

- Published a manuscript titled **"Leptogenesis in a Left-Right Symmetric Model with double-seesaw"** in the JHEP journal with DOI: 10.1007/JHEP03(2024)029.
- Published a manuscript titled **"LHC signatures of sterile neutrinos in a minimal radiative extended seesaw framework"** in the journal Int.J.Mod.Phys.A 37 (2022) 01, 2150263(IJMPA) with DOI: 10.1142/S0217751X21502638.
- Contributed a Wolfram Project Notebook titled "**Implementing Smart Background in Particle Detectors Simulated Data Using Neural Networks**" (Notebook Link) during WIS22 to the Wolfram Published Notebook Repository.
- Contributed a Wolfram Project Notebook titled "**Study of Regge Theory Using 2-body Motion in Fractional Spacetime**" (Notebook Link) during WSS22 to the Wolfram Published Notebook Repository.
- Wrote a Wolfram Community Post titled "**Study of Statistical Evolution of a Gaseous system as a consequence of iterative simple rules**" (Post Link) during WSS23.

- Wrote a Wolfram function named "**ResourceFunction["CrossNodeGridGraph"]**" by Utkarsh Patel and Simon Fischer in the Wolfram Function Repository, CrossNodeGridGraph | Wolfram Function Repository.
- Wrote a Wolfram Community Post titled "**Scattering cross-section analysis for self-interacting dark matter**" (Post Link) as a supplementary code file for my results in work 2204.11551 [hep-ph].
- Wrote a Wolfram Community Post titled "**Solutions of Boltzmann equations for the case of thermal leptogenesis in 2 simplified scenarios**" (Post Link) as a supplementary code file for the results in my works 2211.04722 [hep-ph] and 10.1007/JHEP03(2024)029.

LIST OF MANUSCRIPTS UNDER JOURNAL REVIEW:

- A manuscript titled "**Multipartite dark matter in a gauge theory of leptons**" with authors **Utkarsh Patel,** Avnish, Sudhanwa Patra, and Kirtiman Ghosh is ready for submission to JHEP. arXiv no. 2407.06737[hep-ph]
- A manuscript titled **"Numerically analyzing self-interacting dark matter"** is under corrections for the referee report in the EPJC journal. arXiv no. 2204.11551 [hep-ph].
- A manuscript titled **"Cogenesis of visible and dark sector asymmetry in a minimal seesaw framework"** is under review in the JCAP journal. arXiv no. 2211.04722 [hep-ph].
- Manuscript titled **"Estimating Water Levels through Smartphone-Imaged Gauges: A Comparative Analysis of ANN, DL, and CNN Models"** with authors Celso Augusto Guimarães Santos, Mohammad Ali Ghorbani, Erfan Abdi, **Utkarsh Patel**, Siria Sadeddin is submitted (on 1 December 2023) and under review in the Water Resources Management journal.
- A manuscript titled **"Remote sensing and Mathematica-based analysis using net-encoder and deconvolution models for predicting lake surface area changes"** with authors Mohammad Ali Ghorbani, Debu Misra, Celso Augusto Guimarães Santos, Erfan Abdi, **Utkarsh Patel**, Sophia Ghanimeh, Siria Sadeddin, Golmar Golmohammadi, Dongkyun Kim is submitted (on 20 February 2024) and under review in the Journal of Environmental Management.
- A manuscript titled "**Study of Statistical Evolution of a Gaseous system as a consequence of Iterative Simple Rules**" with authors Utkarsh Patel, Jon Lederman is a part of the Wolfram Summer School 2023 Proceedings.
- A poster titled "**Numerically analyzing Self-Interacting Dark Matter**" at the "DAE-HEP 2022" conference held at IISER Mohali from 12-16 December 2022 is a part of the conference proceedings.

ONGOING / UPCOMING PROJECT WORKS & CO-CURRICULAR ACTIVITIES:

- **Manuscripts ready for submission**
  - Manuscript titled "**Singlet-Doublet fermionic dark matter in gauge theory of baryons**" with authors Taramati, **Utkarsh Patel,** Rameswar Sahu, Sudhanwa Patra, Kirtiman Ghosh is being proof-read by the authors and will be ready for submission to a journal by the end of July 2024.
- **Planned upcoming works**
  - Working on a collaborative project with Zafri Ahmed Borboruah and Lekhika Malhotra from IIT Bombay on the implementation of Leptogenesis and a gravitational wave analysis in a universal seesaw extension of the LRSM framework.
  - Collaborating with Professor Mohammad Ali Ghorbani, Water Engineering Department, University of Tabriz, in an upcoming project on implementing Lukas-Kanade and machine learning methods for fluid optical flow in river water.

TRAINING / PROJECTS COMPLETED:

- Successfully completed a project under Dr. Vinay Gupta (University of Delhi) on "**Home automation using gesture control and voice recognition**" using Arduino-operated Bluetooth and radio-frequency transmission as a part of my electronics lab project during the 3rd-4th semester of my Post graduation for the academic session 2016-2018 at Dept. of Physics and Astrophysics, University of Delhi.
- 2-month online course titled "Data-driven Astronomy" by The University of Sydney on Coursera. Certificate earned on Sunday, June 23, 2019, 7:42 AM GMT.
- 2-month internship for physics content development at Evelyn Learning Systems as Subject Matter Expert (SME), physics during Feb-March 2019.
- 2-month course with certificate in C++ and SQL programming languages from Microvision Technologies Institute, Kanpur, in 2012.
- 2-month course with a certificate in JAVA core programming language from Microvision Technologies Institute, Kanpur, 2013.
- 2-month Upper-Intermediate Spoken English course with a certificate from the British Council, New Delhi, from March 2019 to May 2019.

TALKS/LECTURES ATTENDED:

- Participated in an annual Physics Visitors Program -2017 organized by the Physics Dept. (D.U.) on 27 March 2017.
- Attended a lecture titled 'Chile: The World Capital of Astronomy' by Guillermo A. Blanc. at the Physics Dept. (D.U.).
- Attended a lecture titled 'General Theory of Relativity' by Ajith Parameswaran at St. Stephen College.
- Attended a lecture titled 'Introductory String Theory' by Shinji Hirano at Physics Dept. (D.U.).
- Attended a lecture titled "Emergence of Quantum Technologies in the 21st Century" by Prof. Prasantha Panigrahi at the Dept. of Physics, IIT Bhilai, on 9th October 2023.

POSITIONS OF RESPONSIBILITY:

- Anchoring and Stage management for the conference "ICRTSE-2024" held at IIT Bhilai on 9th February 2024.
- DPGC student representative for the Physics Department in the IIT Bhilai Senate for the academic year 2021-2022.
- Successfully volunteered for IIT Bhilai Annual Convocation Programme 2022.
- Teaching Assistant for the Particle Physics and C programming language course during my PhD.
- Teaching Assistant for the Physics lab of B. Tech 1st year students during my PhD.
- Successfully coordinated the "Physics Journal Club" for the year 2019 during the first year of my PhD.
- Successfully co-founded the "Quantum Leap Club" related to Quantum Computing during the first year of my PhD.
- Successfully coordinated stargazing events for students through the institute's telescopes during the first year of my Ph.D.
- School Captain for the year 2012-13.

EXTRACURRICULAR ACTIVITIES:

- Won the best athlete award at Udaan 2011 held at A.H.S.S., Kanpur
- Secured second position in Inter School Dance Competition held at D.P.S Azad Nagar, Kanpur
- Participated in Inter School Debate Competition held at A.H.S.S., Kanpur
- **Hobbies –** In my leisure time, I like to listen to music, stream YouTube and play cricket.
- **Other Skills –** Touch Typing.

DECLARATION:

The Information presented above is correct and valid to the best of my knowledge.

Utkarsh Patel
July 2024