Vanshaj Kerni, M.Sc

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https://vanshaj18.github.io/

Education

2018 – 2023 **Integrated M.Sc. Physics, Indian Institute of Technology Roorkee, India** (in Astrophysics).
Thesis title: *Analysing the evolutionary connection of CSPNe of [WR], wels and PG-1159.*
Thesis Supervisors: *C Muthumariappan, Moumita Maiti*
Department Gold Medalist
Major GPA: 90.2% (8.52)

Employment History

2023 – Present **Folium labs, Arithmic,** Junior Research Scientist
I work as Junior Research Scientist at Folium Labs (arithmic), executing, implementing and developing Layer 2 to scale while inheriting the security of ethereum mainnet.

Research Experience

May 2022 – June 2023 **Undergraduate research student**, Indian Institute of Astrophysics [pdf]
Studied the correlation among PG1159, *WELS*, [WR] hydrogen deficit stars using the photometric flux data from IRAS, 2MASS and WISE catalogue to investigate the evolution of *WELS* and [WR] to PG-1159 stars under the guidance of Prof. C Muthumariappan, Stars and Galaxy group.

Nov 2021 – July 2022 **Undergraduate research student**, Delhi University
Studied the evolution of cosmic voids (under-densities) with Chaplygin gas Dark energy to constrain cosmological constants using Mathematica for analytical solutions.

May 2021 – Dec 2021 **Undergraduate research student**, Department of Mathematics, IIT Roorkee [pdf]
Investigated the effects of stenosis on blood flow by modelling blood vessel as a tube with sudden expansion and contraction regions via both analytical and computational methods.

Oct 2021 **Hyperion case study competition**, IIT Kanpur [pdf]
Presented the framework for the calculation of local dark matter density in the milky-way with symmetry using theoretical analysis and analytical analysis using the radial velocity data with ROOT.

June 2020 – Aug 2020 **Undergraduate summer research fellow**, Indian Institute of Sciences [pdf]
Verified the Bethe-Bloch energy loss relationship for electrons, protons and alpha particles moving in different mediums (copper, aluminum) using Geant4 simulation software and validated the results with the values from NIST Standard database.

Professional Affiliations

June 2023 – Present **American Physical Society** – Student Member

Professional Affiliations (continued)

April 2023 – Present	**Indian Physics Association** (IPA), Roorkee Chapter – Student Member
May 2022 – Present	**Astronomical Society of India** – Student Member
May 2022 - June 2023	**Indian Pulsar Timing Arrary**–InPTA – Associate Member
Aug 2021 - Aug 2022	**American Physical Society** – Student Member

Skills

Languages	Strong reading, writing and speaking competencies for English, Hindi.
Programming	Java, Python, MATLAB, Mathematica, Rust, LaTeX,
Databases	MySQL, NASA-ADS, IRAS, 2MASS, WISE.
Web Dev	HTML, CSS, Git
Misc.	Academic Research, Teaching, LaTeX typesetting and publishing, Research Communication.

Awards and Achievements

June 2023	**Department Gold Medal**, For securing the highest CGPA among the 2018 passing batch.
Mar - Aug 2022	**Visiting Student Fellowship**, Indian Institute of Astrophysics.
Jan 2020 - Jan 2022	**Merit-cum-Means Scholarship** of $10,000$/month rupees to top 2% of total batch strength.
Oct 2021	**Gold Medal** IIT Kanpur Hyperion Research Case Study Competition.
Sept 2021 - June 2022	**Astrophysics Research Fellow**, Sarstem.
Sept 2021 - Oct 2021	**Undergraduate Student Researcher**, Society for Space Education Research and Development (SSERD).
March 2021	**Silver Medal** in the 9^{th} Inter IIT Tech Meet developing a web-platform to display satellite data for ISRO's satellite.
June - Aug 2020	**Summer Research Fellowship** of 2500 rupees under Indian Academy of Science.
July 2020	**Bronze Medal** among 1000 participants in astrophysics competition held by International Astronomy and Astrophysics Competition.
Feb 2019	**Chittal Arasakesari Annual Excellence Award** of $10,000$ rupees, presented among the all undergraduates batch of 2018.

Conferences and Summer School

April 2023	Attended ICTP Giambiagi Winter School on Cosmology
July 2022	Attended ICTP Summer School on Cosmology.
Sept 2021	Attended Dark Matter 2021: From the Smallest to the Largest Scales.
Aug 2021	Attended SLAC Summer School: Higgs Fair.
July 2021	Attended in Sagan Exoplanet Summer Workshop.
June 2019	Attended NIUS Summer school.

Academic & Community Service

June 2021 - Present
Citizen science contributor, Zooniverse
Dark Energy Explorers, Gravity Spikes, Star Notes, Black Hole Hunters.

July 2020 - Present
Ambassador, IAAC
Work is to spread the knowledge of astronomy and inculcate interest for research in astrophysics and astronomy in young students through workshops and teaching. Also act as mentor for IAAC competition.

Aug 2022 - Jan 2023
Mentor, Student Mentorship Program, IIT Roorkee
Mentored six first-year undergraduate students within the Department of Physics, guiding and supporting through the complexities of their first year in college.

Jan 2022 - Jan 2023
Additional Secretary, Physics and Astronomy Club, IIT Roorkee.
Co-lead the club in organising numerous scientific talks, colloquiums, events, workshops and education outreach events for STEM/non-STEM college and school students.

March 2022
Collaboration speaker
Presented the work of the Radio project collaboration at the 40th annual meeting of the Astronomical Society of India.

Catering coordinator
Coordinated the meal and refreshments arrangements for the attendees at the 40th annual meeting of the Astronomical Society of India.

Jan 2019 - May 2022
Co-Leader Radio Telescope Project
Group leader for the Radio Telescope student project to establish a radio telescope at the Department of Physics, IIT Roorkee.

July 2018 - May 2019
English Tutor IIT Kanpur Hyperion Research Case Study Competition.

Relevant Coursework

Nuclear Astrophysics	Academic Coursework
Astrophysics-I	MIT OCW
Stellar Structure and Evoltion	Lecture Notes on Stellar Structure and Evolution
Plasma Physics	Introduction to Plasma Physics and Controlled Fusion
Numerical and Computational Physics	Computational Methods with MATLAB
Machine Learning	The Elements of Statistical Learning
General Relativity	Lectures by Prof. Alex Flournoy, U Boulder
Particle Physics	Lectures by Prof. Alex Flournoy, U Boulder
HPC and Parallel Computing	University of Colorado, Boulder, Coursera
Fundamentals of Deep Learning	NVIDIA Deep Learning Institute
From Big Bang to Dark Energy	University of Tokyo, Coursera
Astro 101: Black Holes	University of Alberta, Coursera

References

Available on Request