RIYA SINGH

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PROFESSIONAL SUMMARY

Graduate student with 6 years of experience in experimental design and data analysis. Proficient in analyzing complex datasets and developing innovative methodologies to advance scientific research and practical applications.

LABORATORY EXPERIENCE

Dark Matters Lab, Purdue University West Lafayette, IN
Graduate Researcher May 2021 - Present

- Ensured continuous operation of local R&D detector through regular repairs and maintenance of gas and vacuum systems, leveraging **LabVIEW** for real-time monitoring of system parameters.
- Configured and calibrated a UTI with cylindrical capacitor to enable precise liquid height measurements in detector.
- Assembled PCBs with **surface-mount soldering** for PMTs, employing electronic test equipment such as **oscilloscopes** and multimeters to assess and reduce electronic noise levels by 50% , enhancing performance.
- Achieved data acquisition from PMTs by configuring & deploying DPP-DAW firmware on CAEN digitizers.
- Applied **Gaussian filters** to smooth digitizer outputs, reducing noise and improving signal quality for accurate analysis.

IIT Bombay Student Satellite Program Mumbai, India
Attitude Determination & Control System Head May 2018 - April 2019

- Spearheaded a team of 8 to develop a fail-safe **Python** framework for simulating state estimators and attitude controllers.
- Developed **test protocols** and enhanced system reliability by 20% through simulated testing of control algorithms, fostering a culture of quality assurance.
- Analyzed electrical, mechanical, and control **requirements** for star-trackers to assess feasibility as attitude sensors.
- Delivered an oral presentation at 2019 International Conference on Small Satellites and Systems, Hyderabad, India.

DATA SCIENCE EXPERIENCE

Dark Matters Lab, Purdue University West Lafayette, IN
Graduate Researcher May 2021 - Present

- Collaborated with international researchers in XENON collaboration to enhance detection sensitivity for neutrinos.
- Maintained robust software environment for 200+ analysts by managing GitHub branches & tracking package updates.
- Implemented a clustering algorithm with scikit-learn to reduce time-space localized backgrounds by 70%.
- Developed data-driven background models and templates and trained a boosted decision tree to distinguish signals from background noise, improving analysis integrity by 50%.
- Performed rigorous χ^2 and likelihood tests to exclude Hα SFR at 81% confidence, accounting for various backgrounds.

Astrophysics Group, IIT Bombay Mumbai, India
Undergraduate Researcher May 2018 - April 2021

- Implemented Monte Carlo simulations to predict signals with star formation rate (SFR) inferred from Hα versus UV+IR.
- Performed rigorous χ^2 and likelihood tests to exclude Hα SFR at 81% confidence, accounting for various backgrounds.

COURSEWORK

Microprocessors and Automatic Control IIT Bomaby, India

- Analyzed and simulated time and frequency response of Linear Time-Invariant systems in **MATLAB** and Simulink.
- Designed automatic cruise control system with **microcontrollers** and optimized controller performance in simulations.

LEADERSHIP EXPERIENCE

Purdue Graduate Student Government West Lafayette, IN
Vice Chair, Community Team June 2024 - Present

- Promoted mental health awareness and resources at Purdue University by hosting a brunch for 100+ graduate students and coordinating relaxation focused events, including paint night and music night, during Mental Health Action Week.
- Organized celebrations of three festivals from various parts of world to educate student community about diverse cultures, fostering a global and inclusive environment.

IIT Bombay Student Satellite Program Mumbai, India
System Head, Great Lunar Expedition for Everyone August 2019 - April 2020

- Supervised a team of 9 to identify payloads and design setup for on-ground testing.
- Evaluated chip-satellite technology to space-qualify two innovations from IIT Bombay, AJIT Microprocessor and Nanosniff gas detector; chose AJIT Microprocessor for mission.
- Prepared "Lunar Exploration through ChipSats" for presentation at International Astronautical Congresses (2020).
- Organized Ground Station Workshop attended by 50+ students, demonstrating operation of rotor and rotor interface for precise antenna alignment.

HONORS & AWARDS

- Lijuan Wang Memorial Award by Department of Physics & Astronomy, Purdue University. 2023
- Future Research Talent Award by Australian National University. 2019
- Undergraduate Research Award by Indian Institute of Technology. 2019
- Kishore Vaigyanik Protsahan Yojana by Department of Science & Technology, Government of India. 2016

SELECTED PUBLICATIONS

- Singh, R. XENON Collab. (2023) Search for events in XENON1T associated with Gravitational Waves Phys. Rev. D.
- Singh, R. & Rentala, V. (2021). Neutrinos from the cosmic noon: a probe of the cosmic star formation history. JCAP.
- Riya, et al., Closed-Loop Simulation for Attitude Control of Nano-satellite, Advances in Small Satellite Technologies, pp 87- 97, Springer, Singapore (2020).

EDUCATION

Purdue University, College of Science West Lafayette, IN
PhD in Physics & Astronomy August 2021 - Present

Purdue University, College of Science West Lafayette, IN
MS in Physics & Astronomy | GPA: 4.0/4.0 August 2021 - May 2024

Indian Institute of Technology (IIT) Bombay Mumbai, India
B.Tech. in Mechanical Engineering | GPA: 9.36/10 July 2016 - August 2020

CERTIFICATION

- **Image Processing and Analysis for Life Scientists** – EPFL (edX)
- **Data Science: Machine Learning** – Harvard University (edX)

ADDITIONAL KNOWLEDGE

- Gained foundational understanding of **medical imaging concepts** through *Introduction to Physics in Modern Medicine*.