

Rushabh Gala

 [rushabhgala](#) |  [rushabh-gala-b680b4149](#) |  rngala@ncsu.edu

EXPERIENCE

North Carolina State University Raleigh, NC 2018 - Present

- **Led data analysis and modeling** efforts to understand background radiation patterns for the LEGEND experiment, resulting in a significant contamination reduction by a **factor of 100**. Presented findings at national and international conferences, contributing to the advancement of nuclear physics research.
- Utilized **statistical techniques**, including **Bayesian statistics**, to perform intricate simulations and analyze large datasets, maximizing Poissonian likelihood functions. Presented results at the prestigious TAUP-2023 conference, receiving recognition for groundbreaking research.
- **Developed custom software** in C++ to calculate photon detection probabilities in a light-sensitive SiPM detector, originating from radioactive decays in Liquid Argon. The software facilitated precise experimental planning and analysis, ensuring accurate results.
- **Planned, developed, and executed** a Geant4-based custom software to build a complex system with more than 1000 detectors with mm precision. Conducted precise Monte Carlo simulations of radioactive decays to determine radioactive contamination and performed rigorous analysis to meet the ambitious objective of achieving **< 1 count of background noise in 10 years of data**.
- Implemented **regression and non-linear fitting** methods to estimate the age of Brazil nuts using radioactive decay techniques, achieving a remarkable 5% error margin. Published results in peer-reviewed journals, showcasing scientific rigor and expertise.
- Developed sophisticated Python and C++ tools to meticulously design the layout of detectors, optical fibers, and ancillary materials for our experiment. Collaborated closely with the engineering team to define spatial constraints, ensuring seamless integration.
- Provided **expert guidance** on data analysis and interpretation to a student investigating simulation efficiency differences between CAD-based and solid-based geometry implementations in Geant4. The results of our collaboration were pivotal in determining the optimal approach for future simulations, significantly enhancing experimental efficiency and accuracy.

Tata Institute of Fundamental Research Mumbai, India 2017 - 2018

- Conducted in-depth **data analysis** of experimental results from an accelerator-based experiment, leading to the discovery of novel energy levels in the ^{90}Zr nucleus. Published findings in renowned scientific journals, contributing significantly to the field of nuclear physics.
- Implemented **advanced non-linear fitting techniques** to determine the lifetime of an isomeric state using slow-fast coincidence methodology. Managed large datasets with meticulous attention to detail, ensuring accurate results and data integrity.
- Optimized the voltage response of semiconductor and plastic detectors, improving energy resolution by **10%** and enhancing experimental precision. Presented research findings at national and international conferences, receiving accolades for outstanding contributions to the field.
- Delivered an engaging **oral presentation** and won a prestigious **first prize** at the Science Academies' Refresher's Course on Mathematical Physics, showcasing exemplary communication and presentation skills.

RELEVANT SKILLS

Programming Skills	C++, Python, Bash, Julia, Mathematica
Technical Skills	Linux, Git, Docker, JSON, snakemake Office Suite, Tableau, Grid computing
Interpersonal Skills	Course Instructor : Undergraduate physics courses, APS Student Ambassador, Events Head: Indian Graduate Student Association, Public Relations Team

EDUCATION

PhD in Physics	NC State University	2018-Present
Master's in Physics	University of Mumbai	2015-2017
Bachelor's in Physics	Ramnarain Ruia College	2012-2015

SELECTED PUBLICATIONS

- Abgrall, N. et al. (2021). "LEGEND-1000 Preconceptual Design Report". In: arXiv: [2107.11462](#).
- Dey, P. et al. (2022). "Experimental investigation of high-spin states in ^{90}Zr ". In: *Phys. Rev. C* 105 (4), p. 044307. DOI: [10.1103/PhysRevC.105.044307](#).
- Gala, R. (2023). "Background Modeling for LEGEND-200". In: *Proceedings of Scinece (accepted)*.